

ADMISSION & EXAMINATION RULES
for
Bachelor of Computer Applications (BCA)/
Bachelor of Science (Information Technology) B. Sc. (IT)

1. OBJECTIVE

To prepare highly skilled professionals, with a strong conceptual and theoretical background in the fields of information technologies, especially in the emerging areas of software technologies.

2. THE PROGRAMME

Highlights of the course are described in the following table:

a.	<i>Name of the Programme</i>	Bachelor of Computer Applications (BCA)/ Bachelor of Science (Information Technology) B. Sc. (IT)
b.	<i>Nature</i>	Regular and Full Time
c.	<i>Duration</i>	Three Years (6 Semesters)
d.	<i>Total number of credits</i>	120
e.	<i>Medium of Instruction and English Examinations</i>	English
f.	<i>Eligibility Criteria</i>	A candidate must have: Passed Senior Secondary (12th Standard/Intermediate) examination with Mathematics as one of the passed subjects from CBSE or any other Board recognized by Jamia Hamdard as equivalent thereto, securing at least 50% marks or equivalent CGPA in aggregate. (OR) Passed Senior Secondary (12th Standard/Intermediate) examination with Commerce background having one paper Accountancy or Business Mathematics, securing at least 50% marks or equivalent CGPA in aggregate. (OR) Passed Senior-Secondary (12th standard/intermediate) examination having one Theory paper Computer Science / Multimedia and Web Technology / Information Technology securing atleast 50% marks or equivalent CGPA in aggregate.
g.	<i>Selection procedure</i>	The admission to the BCA/ B. Sc. (IT) programme will be on the basis of merit of the qualifying examination and/or interview to be conducted by Jamia Hamdard.
h.	<i>Total Seats</i>	60 (Inclusive of seats reserved for NRI / sponsored candidates; additional seats are available for Foreign Nationals)
i.	<i>Period of Completion</i>	Not more than 05 years (10 Semesters)
j.	<i>Commencement of the Programme</i>	July of the every academic session

3. PROGRAMME STRUCTURE

Semester-wise course structure, guidelines for teaching, practical and associated assessment of BCA/ B. Sc. (IT) programme is described in the following tables:

Course	Credits	Percentage (%) (Approx)
Foundation Core (FC)	20	17
Departmental Core (DC)	74	62
Departmental Electives(DE)	18	15
Open Electives (OE)	08	06
Total	120	100

L-T-P stands for number of contact hours as Lecture-Tutorial-Practical in a week.

Semester – I

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCA 101	Introduction to Computer and IT	FC	30	70	100	3-1-0	4
BCA 102	Introduction to 'C' Programming	DC	30	70	100	3-1-0	4
BCA 103	Mathematics – I	FC	30	70	100	3-1-0	4
BCA 104	Communication Skills	FC	30	70	100	2-0-0	2
	OE – 1	OE	30	70	100	3-1-0	4
BCA 105	'C' Programming Lab	DC	50	50	100	0-0-4	2
Total						14-4-4	20

Semester – II

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCA 201	Introduction to Data Structures	DC	30	70	100	3-1-0	4
BCA 202	Computer Organization	DC	30	70	100	3-1-0	4
BCA 203	Mathematics – II	FC	30	70	100	3-1-0	4
BCA 204	Internet and Web Technology	DC	30	70	100	3-1-0	4
BCA 205	Data Structures Lab	DC	50	50	100	0-0-4	2
BCA 206	Internet Technology Lab	DC	50	50	100	0-0-4	2
*BCA ES	Environmental Studies		30	70	100	2-0-0	0
Total						14-4-8	20

*This subject may be taught in both the semesters (Semester-I and Semester-II) at the discretion of the Department. However, Semester Examination will be conducted only at the end of Semester-II.

Semester – III

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCA 301	Numerical Methods and Statistical Techniques	FC	30	70	100	3-1-0	4
BCA 302	Fundamental Concepts of Operating Systems	DC	30	70	100	3-1-0	4
BCA 303	Introduction to Object Oriented Programming using 'C++'	DC	30	70	100	3-1-0	4
BCA 304	Data communication and Computer Networks	DC	30	70	100	3-1-0	4
BCA 305	Numerical Methods and Statistical Techniques Lab	FC	50	50	100	0-0-4	2
BCA 306	'C++' Programming Lab	DC	50	50	100	0-0-4	2
Total						12-4-8	20

Semester – IV

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCA 401	Introduction to Database Management System	DC	30	70	100	3-1-0	4
BCA 402	Introduction to Java Programming	DC	30	70	100	3-1-0	4
	DE – 1	DE	30	70	100	3-1-0	4
	DE – 2	DE	30	70	100	3-1-0	4
BCA 403	Database Management System Lab	DC	50	50	100	0-0-4	2
BCA 404	Java Programming Lab	DC	50	50	100	0-0-4	2
					Total	12-4-8	20

Semester – V

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Semester Exam	Total		
BCA 501	Software Engineering	DC	30	70	100	3-1-0	4
	DE – 3	DE	30	70	100	3-1-0	4
	DE – 4	DE	30	70	100	3-1-0	4
	OE – 2	OE	30	70	100	3-1-0	4
BCA 502	Lab based on DE	DE	50	50	100	0-0-4	2
BCA 503	Software Engineering Lab	DC	50	50	100	0-0-4	2
					Total	12-4-8	20

Semester – VI

Paper Code	Title of the Paper	Course Type	Marks			L-T-P	Credits
			Internal Assessment	Viva voce	Total		
BCA 601	Industrial Project and Dissertation	DC	300	200	500	0-0-40	20

Grand Total of Credits = 120

DEPARTMENTAL ELECTIVES (DE)

Paper Codes	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
DE – 1						
BCA DE11	Management Information System	30	70	100	3-1-0	4
BCA DE12	Introduction to Wireless Communication	30	70	100	3-1-0	4
BCA DE13	Computer Ethics	30	70	100	3-1-0	4
BCA DE14	E-Commerce	30	70	100	3-1-0	4
DE – 2						
BCA DE21	Introduction to Linux Operating System	30	70	100	3-1-0	4
BCA DE22	Introduction to Mobile Computing	30	70	100	3-1-0	4
BCA DE23	Introduction to Artificial Intelligence	30	70	100	3-1-0	4
DE – 3						
BCA DE31	Fundamentals of .net Programming	30	70	100	3-1-0	4
BCA DE32	Introduction to Cloud Computing	30	70	100	3-1-0	4
BCA DE33	Soft Computing	30	70	100	3-1-0	4
DE – 4						
BCA DE41	Image Processing	30	70	100	3-1-0	4
BCA DE42	Cryptography	30	70	100	3-1-0	4
BCA DE43	Cyber Crimes and Cyber Laws	30	70	100	3-1-0	4
BCA DE44	Pattern Recognition	30	70	100	3-1-0	4

OPEN ELECTIVES (OE)

Paper Codes	Title of the Paper	Marks			L-T-P	Credits
		Internal Assessment	Semester Exam	Total		
OE – 1						
BCA OE11	Organization Behavior	30	70	100	3-1-0	4
BCA OE12	Financial Accounting	30	70	100	3-1-0	4
BCA OE13	Technology and Culture	30	70	100	3-1-0	4
BCA OE14	Operational Research	30	70	100	3-1-0	4
OE – 2						
BCA OE21	Introduction to Sports Technology	30	70	100	3-1-0	4
BCA OE22	Customer Relationship Management	30	70	100	3-1-0	4
BCA OE23	Managing and Marketing Technology	30	70	100	3-1-0	4

4. **MODE OF CURRICULUM DELIVERY**

Mode of curriculum delivery includes classroom teaching, assignments, test, lab work, presentations, participation in relevant events and regularity.

5. **ATTENDANCE**

- a. All students are supposed to attend every lecture and practical classes. However, the attendance requirement for appearing in the examination shall be a minimum of 75% of the classes held.
- b. Each one-period teaching shall account for one attendance unit.
- c. The concerned teacher will take a roll call in every scheduled class, maintains and consolidate the attendance record, which would be submitted to the Head of the Department at the conclusion of the semester.
- d. Attendance on account of participation (with prior permission from the Head of the Department) in the co-curricular/extra-curricular activities can be granted by the Dean on receipt of certificates or recommendations of the respective activity issued by the Head of the Department.
- e. Attendance records displayed on the Notice Board from time to time, in respect of short attendance, shall be deemed to be a proper notification and no individual notice shall be sent to the students/local guardian.
- f. In case a student is found to be continuously absent from the classes without information for a period of 30 days, the concerned teacher shall report it to the Head of the Department.
- g. Head of the Department may recommend for striking off the name of a student from rolls, after ensuring 'one month continuous absence', from all the concerned teachers.
- h. A student, whose name has been struck off on account of long absence may apply to the Dean for readmission within 15 days of the notice of striking off the name. The readmission shall be effected on payments of prescribed readmission fees.
- i. A student with less than 75% attendance in a subject shall not be allowed to appear in that subject in the semester examination. The Head of the Department shall recommend all such cases to the Dean of the School.
- j. The Dean, on the recommendation of the Head of the Department, may consider the relaxation of attendance up to 10% on account of sickness and /or any other valid reason. No application for relaxation of attendance (duly certified by a Registered Medical Practitioner/Public hospital or a competent authority) will be entertained after 15 days from the recovery from illness etc.

6. **INTERNAL ASSESSMENT**

- a. Internal assessment, to be made by concerned teachers, will be based on minor tests, quizzes, presentation, programming test, demonstrations and assignments.
- b. Maximum of Three minor tests, with a total of 20 marks, for each theory paper shall be mandatory. Other modes of assessment shall account for remaining 10 marks.
- c. A minor test each shall be scheduled after the completion of first and second term.
- d. Dates for minor test will be announced at the beginning of the semester, by the examination coordinator.

- e. The teacher concerned shall maintain a regular record of the marks obtained by students in minor tests and display the same in due course.
- f. The concerned teachers shall submit the compiled internal assessment marks to the Head of the Department, on the conclusion of teaching of the current semester.
- g. The Head shall display a copy of the compiled sheet, of internal assessment marks of all the papers, before forwarding it to the Controller of Examination, i.e. at the conclusion of the semester.
- h. A promoted candidate, who has to reappear in the examination of a paper, will retain internal assessment marks.
- i. In the case of re-admission, the candidates shall have to go through the internal assessment process afresh and shall retain nothing of the previous year.

7. SEMESTER EXAMINATIONS

Prescriptions for conducting semester examinations of theory and lab papers, those shall be conducted after the conclusion of each of the semesters, are presented in the following table:

a.	Mode	(Theory Papers)	Written only
		(Lab Papers)	Written, Demo, Programming and viva- voce.
b.	Duration	(Theory paper)	03 Hours
c.	Total Marks	(Theory Papers)	70 (Seventy only)
		(Lab Papers)	50 (Fifty only)

8. DISSERTATION/INDUSTRIAL PROJECT

- a. Each student of the final semester will have to go for a Dissertation/Industrial Project work either in the industry or in the Department under the guidance of one or two faculty members.
- b. Period of completion of Dissertation/Industrial Project work shall be full one semester.
- c. There shall normally be two supervisors-one internal and one *external (in the case of industry project form the place where the student is pursuing project-work)*.
- d. All the students, who are pursuing the Dissertation/Industrial project work, shall be continuously in touch with the internal supervisor.
- e. **There shall be a mid-term evaluation of the progress** and the internal supervisors will conduct it. However, an internal supervisor may ask the student to submit a confidential progress-report from the external supervisor (*in the case of industry project*).
- f. All the candidates shall submit **Three (03)** hard copies of the project reports that are duly approved and signed by internal as well as external (*if applicable*) supervisors.
- g. An external examiner, appointed for the purpose, shall evaluate the project report.
- h. The Head of the Department shall fix a date and time for viva-voce examinations, on receipt of the evaluation-report of the project reports from the external examiner.

- i. Head of the Department shall forward the compiled total marks (awarded in internal assessment, project Report and Viva-voce Examination), in the project-semester of each of the candidate, to the Controller of Examination.

9. EXAMINATION

- a. The performance of a student in a semester shall be evaluated through continuous class assessment and end semester examination. The continuous assessment shall be based on class tests, assignments/ tutorials, quizzes/ viva voce and attendance. The end semester examination shall be comprised of written papers, practical and viva voce, inspection of certified course work in classes and laboratories, project work, design reports or by means of any combination of these methods.
- b. The marks obtained in a subject shall consist of marks allotted in end semester theory paper, practical examination and sessional work.
- c. The minimum pass marks in each subject including sessional marks (Theory, Practical or Project etc.) shall be 40%.

10. PROMOTION SCHEME

- a. A student will be promoted from 1st year to 2nd year/2nd year to 3rd year provided that he/she is **not having more than 05 (Five) backlog papers** (including Labs; excluding non-credit papers) in total. A student who fails to satisfy the criteria mentioned for the promotion shall **detained** in the same year.
- b. A **detained** Student is not allowed to re-appear in the minor tests. His/her old internal assessment marks will remain same. However, he/she will be required to re-appear in the semester examination for those papers in which he/she had failed, when these papers are offered again (Examination for Odd semester paper will be held in Odd semester, and for Even semester papers will be held in Even semester).
- c. **Supplementary Examination:** For the final year students, students can appear in supplementary examinations in their all backlog papers after the declaration of their Final semester results only.

11. THE GRADING SYSTEM

As per University Rule

12. CALCULATION OF SGPA AND CGPA OF A STUDENT IN A SEMESTER

As per University Rule

After having passed all the SIX semesters, the students shall be eligible for the award of **Bachelor of Computer Applications (BCA)/ Bachelor of Science (Information Technology) B. Sc. (IT)** degree of JAMIA HAMDARD.

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES

The result of successful candidates, who fulfill the criteria for the award of **Bachelor of Computer Applications (BCA)/ Bachelor of Science (Information Technology) B. Sc. (IT)**, shall be classified at the end of last semester, on the basis of his/her final CGPA (to be calculated as per university rule).

SYLLABUS

BCA 101 (INTRODUCTION TO COMPUTER AND IT)

Unit – I

Computer: Definition, Characteristics; Generations of computers and their features, Analog and Digital Computers, Classification of computers: Micro Computers, Mini Computer, Mainframe and Super Computer.

Unit – II

Computer Organization: CPU, ALU, Control Unit; Primary Storage Unit, RAM, ROM, Cache, Registers, Secondary Memory: Magnetic Tape, Magnetic Disks: Floppy and hard disk, Optical Disks; Bus: Control Bus, Address Bus, Data Bus. Input Devices: Punched Cards and Card Readers, Keyboards, Mouse, Joystick, Touch Screen; Output Devices: Hard/Soft copy, Printer: Dot-matrix printer, Daisy wheel, Line, Ink-Jet, Laser Printers.

Unit – III

Number Systems: Decimal, octal, binary and hexadecimal; Conversion from one number system to another; Addition and subtraction in different number systems, fixed and floating point arithmetic; Binary Codes: BCD, EBCDIC, ASCII, Excess-3, Gray Code.

Unit – IV

Operating systems: Definition, Functions, Batch OS, Multiprogramming, Time Sharing.

Unit – V

Elements of IT: Multimedia, Characteristics of multimedia systems, Types of media, Internet: Information Super Highway, Internet Address, E-mail, Telnet, Usenet, FTP, Intranet Definition.

TEXTBOOKS

- V.Rajaraman, Adabala, Neeharika, "Fundamentals of Computers".
- E Balagurusamy, "Computing Fundamentals and C Programming".

REFERENCE BOOKS

- Peter Norton, "Introduction to computers".

BCA 102 (INTRODUCTION TO 'C' PROGRAMMING)

Unit – I

Programming Fundamentals: Algorithms and Flowcharts, problem solving techniques, stepwise refinement; Programming in C: features of 'C', tokens, data type, operators, expression.

Unit – II

Branching Constructs: if-else, switch, conditional operator & goto statements; looping Constructs: while, do-while, for and Jumping statements;

Unit – III

Arrays, string processing, Functions: categories of functions, recursion;

Unit – IV

Pointers: operations on pointers, pointers & structures; Structures and Unions;

Unit – V

Development of efficient programs; Debugging, verification and testing of programs. File Management: Defining & opening a file, closing a file, input operations.

TEXTBOOKS

- Yashwant Kanetkar, "Let us C" eighth edition, 2002.
- Herbert Schildt, "C The Complete Reference" Fourth Edition, 2000.
- Ashok N. Kamthane, "Computer Basics and C Programming", Pearson Education.

REFERENCES

- Kernighan and d. Ritchie, "The ANSI C Programming Language", 2000.
- E. BalaGuruswamy, "Programming in ANSI C", 2008.
- Schaum's Outline Series, "Programming with C", 2nd Edition, 1996

BCA 103 (MATHEMATICS – I)

Unit – I

Matrix Algebra including rank, inverse, linear system of equation, Eigen value & Caley Hamilton Theorem; team working and management.

Unit – II

Differentiation and partial differentiation, derivative of sum, dot product and cross product of two vectors, gradient, divergence and curl;

Unit – III

Successive differentiation, libneitz theorem, partial differentiation,

Unit – IV

Curvature, asymptotes, singular points, concavity, points of inflexion and tracing of Cartesian curve, Differential equation of first order;

Unit – V

System of circles, standard equations and properties of parabola and Ellipse; General equation of second degree in two variables, tracing of conic sections, sphere;

TEXTBOOKS

- Kresyzig, E., “Advanced Engineering Mathematics”, John Wiley and Sons.
- Babu Ram: Engineering Mathematics, vol 1& vol 2

REFERENCE BOOKS

- Jain, R. K. and Iyengar, S. R. K., “Advanced Engineering Mathematics”, Narosa, 2003
- Ramana, “Higher Engineering mathematics” ,TMH.
- B.S. Grewal, “Elementary Engineering Mathematics”, 34th Ed., 1998.

BCA 104 (COMMUNICATION SKILLS)

Unit – I

Review of English grammar; Written and Spoken language; Common Errors in language; Punctuation (purpose, role, importance and use); Effective use of dictionary, thesaurus, encyclopedia, OED; Figures of speech;

Unit – II

Language Skills (listening, Speaking, Reading, Writing); Meaning what you mean;

Listening: Effective and efficient listening in various situations (discussions, lectures, news, seminars, speech, telephone calls etc);

Speaking: Phonetics, intonation, accent, usage; strategies for a good rhetoric; Reading: Purpose;

Comprehension; Tactics and strategies for good reading;

Writing: Guidelines for good writing; various writing styles (General and technical writing styles).

Unit – III

Communication (purpose, role importance, elements); Effective and efficient communication; role of content, context and language; Spoken and written communication Presentation and delivery; Role of speaker and audience;

Unit – IV

Style body language; Discussion and presentation skills of conferences meeting, seminars ;

Unit – V

General and Technical documents (correspondence applications, letter, resumes, CV), drafts, essays, memos; minutes, notes, proposals , précis, reports, summary, synopsis, references, table of contents, acknowledgements, prologue, epilogue, revision; Use of Audio-Visual Aids: OHP, Slides, Charts, Computers etc.

TEXTBOOKS

- Maison, Margaret M., “Examine your English”.
- R S Sharma, “Technical Writing”.

REFERENCE BOOKS

- Bansal, R.K. and J. B. Harrison, “Spoken English For India: A Manual of Speech and Phonetics”, Hyderabad: Orient Longman, 1983.
- Lewis, Hedwig. Body Language, “A Guide For Professionals”, 2000

BCA 201 (INTRODUCTION TO DATA STRUCTURES)

Unit – I

Representation of data, Data types, ADTs and Data Structures, linear and non – linear data structures.

Unit – II

Single and multidimensional arrays, Structures, Static and Dynamic implementation of arrays, Creation, insertion and deletion of linked list, doubly list, circular list etc.

Unit – III

Stacks and its application: Definition and examples, Implementing Push and Pop operations, Stack using dynamic memory allocation, Use of stack in problem solving, infix, prefix and postfix notations and conversions, Recursion using stack.

Unit – IV

Queues: Definition and examples, Sequential and dynamic implementation, Implementation of Insert and remove operations.

Unit – V

Introduction to tree and graph, Searching techniques: Linear Search, Binary Search, Sorting: Bubble Sort, Quick Sort, Merge Sort, Insertion Sort, Selection Sort.

TEXT BOOKS

- Seymour Lipschutz, "Data Structures with C", Schaum's Outline Series
- Langsam Yedidyah, Augenstein J Moshe, Tenenbaum M, "Data Structures using C and C++", PHI

REFERENCE BOOKS

- Horowitz, Sahni, Freed, "Fundamentals of Data Structures in C", Silicon Press
- Kruse R., "Data Structures and Program Design in C", Pearson Education India

BCA 202 (COMPUTER ORGANIZATION)

Unit – I

Logic gates, Boolean functions. Dual of a Boolean function. Inverse of a Boolean function.

Unit – II

Boolean function representation: canonical form, standard form. Boolean function Simplification: Algebraic method, Karnaugh Map method.

Unit – III

Boolean function implementation: NAND implementation, NOR implementation.

Unit – IV

Combination circuits: adder, subtractor, decoder, and encoder, MUX/DEMUX,

Unit – V

Sequential circuits: Flip-flops, registers and Counters.

TEXT BOOKS

- M.M. Mano, "Digital Logic and Computer design", PHI, 1998.
- M.M. Mano, "Computer Architecture", PHI, 1998.
- Malvino and Leach, "Digital Electronics" TMH, 1998.

REFERENCE BOOKS

- William Stallings, "Computer Organization and Architecture".
- Floyd, L.Thomas, "Digital fundamentals", Universal Book Stall, 1998 :
- Hamcher, Vranesic and Zaky, "Computer Organization", MC Graw-Hill.

BCA 203 (MATHEMATICS II)

Unit – I

Introduction to propositional calculus: Statements, logical operations. Truth tables of logical identities, Equivalence of logical identities, Tautologies and contradiction. Negation and De Morgan's law. Conditional and biconditional. Introduction to Boolean algebra: Basic definition and theorems. Boolean expressions. Sum-Of-Products form.

Unit – II

Sets and related operations: Cardinality, Union, Intersection, Complement, Difference, Symmetric Difference, Cartesian Product, subset, superset, power set, Venn diagram, Algebra of Sets, Duality. Properties of operators: commutative, associative, distributive. De Morgan's law. Standard sets.

Unit – III

Relations and their properties: Properties of relation: reflexive, irreflexive, symmetric, asymmetric, antisymmetric, transitive. Matrix of relations, relations represented as digraph. Equivalence relation, partition and equivalence class.

Unit – IV

Functions and its properties: Types of functions: One-to-one, onto, into, everywhere defined, Domain and range. Invertible functions. Composition of functions,

Unit – V

Introduction to recurrence relation: Homogeneous and non-homogeneous recurrence relations. Order and degree of a recurrence relation., Formulation of recurrence relations, Characteristic relation, Solution of recurrence relations.

TEXT BOOKS

- Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH, 1999.
- C.L. Liu, "Elements of Discrete Mathematics", TMH, 2000.

REFERENCE BOOKS

- Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI, 1996.
- Narsingh Deo, "Graph Theory With Application to Engineering and Computer Science", PHI.
- J. P. Trembly & P. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill, 1997.

BCA 204 (INTERNET AND WEB TECHNOLOGY)

Unit – I

Introduction to Internet, History of World Wide Web, Protocols governing the web, Understanding the Internet: syntax of URLs, web page and browsers, search engine. Introduction to Cyber Laws in India,

Unit – II

Internet applications: FTP, Telnet, Email, Chat. Internet addressing: identification of each computer using domain name and IP addresses, DNS.

Unit – III

Introduction to HTML, XML, DHTML and CSS. Formatting Web Pages with the help of different HTML tags, HTML table, HTML form, using CSS for formatting different objects, using DHTML for dynamic designing of web page.

Unit – IV

Introduction to Javascript: Advantage of Javascript, Javascript Syntax, documents, forms, Datatype, Variable, Array, Operator and Expression, Looping Constructor, Event Handling, cookies.

Unit – V

E-Commerce and security issues, Emerging trends, Internet telephony, virtual reality over the web, etc. Intranet and extranet, firewall design issues.

TEXTBOOKS

- Raymond Greenlaw and Ellen Hepp, "Fundamentals of Internet and WWW, TMH.
- Ivan Bayross, "Web Technologies Part II", BPB Publications.
- Pardi, "XML in Action, Web Technology", PHI.

REFERENCE BOOKS

- Thomas A Powell, "HTML The Complete Reference", Tata McGraw Hill Publications.
- Burdman, "Collaborative Web Development", Addison Wesley

BCA ES (ENVIRONMENTAL STUDIES)

Unit – I

Introduction: components of the environment, environmental degradation. Ecology-Elements of Ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Unit – II

Air Pollution and Control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures,

Unit – III

Water Pollution and Control: Hydrosphere, natural water, pollutants their origin and effects, river, lake/ground water pollution, standards and control,

Unit – IV

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Unit – V

Noise Pollution: Sources, effects, standards and control.

TEXT BOOKS

- Masters, G.M., "Introduction to Environmental Engineering and Science", Prentice Hall of India Pvt. Ltd., 1991.
- Nebel. B J., "Environmental Science", Prentice-Hall Inc., 1987.

REFERENCE BOOKS

- Odum EP, "Ecology: The Link between the natural and social sciences", IBH Publishing Com. Delhi

BCA 301 (NUMERICAL METRHOES AND STATISTICAL TECHNIQUES)

Unit – I

Numerical methods versus numerical analysis, Errors and Measure of Errors; Non-linear Equations, Iterative solutions, Multiple roots and other difficulties, Interpolation method, Bisection method, false position method, Newton-Raphson Method.

Unit – II

Simultaneous Solutions of Equations, Gauss elimination Methods, Gauss Jordan methods, Gauss Siedel methods; Interpolations, Lagrangian polynomials, Newton's methods: Forward Difference methods, Backward Difference methods, Divided difference methods, curve fitting.

Unit – III

Numerical Integration: Trapezoidal Rule, Simpson 1/3 Rule Simpson's 3/8 Rule; Numerical Differentiation by polynomial Fit.

Unit – IV

Statistical techniques: Measure of central tendency, Preparing frequency distribution table. Mean, arithmetic mean, Harmonic Mean. Median , mode; Measure of dispersion, skewness and kurtosis, Mean deviation. Standard deviation, co-efficiency of variation, Moments.

Unit – V

Correlation, Regression

Least square fit linear trend, Non-linear trend:

$$Y = ax^b; \quad Y = ab^x; \quad Y = ae^x$$

$$\text{Polynomial fit: } Y = a + bx + cx^2$$

TEXT BOOKS

- S. S. Sastry: Introductory Methods of Numerical Analysis, Pearson Education.
- C. B. Gupta, Vijay Gupta: Introduction to Statistical Methods, Vikas Publishing.

REFERENCE BOOKS

- V Rajaraman: Computer Oriented Numerical Methods, Pearson Education
- Francis Scheld: Numerical Analysis, TMH
- Jain, Iyengar and Jain: Numerical Methods for Scientific and Engineering Computations, New Age Int.
- M Goyal: Computer Based Numerical and Statistical Techniques, Firewall Media, New Delhi.

BCA 302 (FUNDAMENTAL CONCEPTS OF OPERATING SYSTEMS)

Unit – I

Overview of Operating System: Computer System Structure, Operating Systems Structure, Operating System functions; Computing Environments: Traditional Computing, Client-Server Computing, Peer-to-Peer Computing, Web based Computing, Mobile Computing.

Unit – II

Process Management: Process Concept, Process Scheduling, Inter Process Communication, Multithreading; Scheduling Algorithms: FCFS, SJF, RR, and Priority.

Unit – III

Deadlocks: introduction, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock; Process Synchronization: The Critical-Section Problem, Semaphores, Classic Problems of Synchronization.

Unit – IV

Memory management: Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.

Unit – V

Storage Management: File System, File Concept, Access Method, Directory and Disk Structure, File Sharing; Secondary-Storage Structure: Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling; I/O Systems: Overview, I/O Hardware, Application I/O Interface.

TEXT BOOK

Abraham Silberschatz, Peter Baer Galvin and Greg Gagne: Operating System Concepts. 8th Edition, John Wiley and Sons

REFERENCE BOOKS

- William Stallings: Operating Systems Internals and Design Principles, 6th Edition, Prentice Hall
- Andrew S Tanenbaum: Modern Operating Systems, 3rd Edition, Prentice Hall

BCA 303 (INTRODUCTION TO OBJECT ORIENTED PROGRAMMING USING C++)

Unit – I

Principles of Object Oriented Programming (OOP): Concepts of structured and object oriented programming; advantage of OOP methodologies.

Unit – II

Characteristics of OOP languages: objects, classes, Data Abstraction, Encapsulation, inheritance, reusability, polymorphism and operator overloading, function overloading.

Unit – III

Introduction to C++: Keywords, Data types, Constants, Variables, Expressions and statements, Operators; Control Structures: if, if... else, switch; Repetitive Statements: for, while, do... while; Pointers, arrays and strings.

Unit – IV

Functions in C++: Parameter passing, Friend Functions, Inline Functions, Function Overloading, Operator overloading; Classes and Objects; Constructors and Destructors

Unit – V

Inheritance: Single Inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical Inheritance, Hybrid Inheritance; Pointers, Virtual Functions and Polymorphism;

TEXT BOOK

- E Balaguruswamy: Object oriented programming with C++, Fifth Edition, Tata McGraw Hill

REFERENCE BOOKS

- Bjarne Stroustrup: The C++ Programming Language, Special Edition, Pearson Education
- Bruce Eckel: Thinking in C++, 2nd Edition, Pearson Education

BCA 304 (DATA COMMUNICATION AND COMPUTER NETWORKS)

Unit – I

Basic Concepts: Components of data communication, distributed processing, standards and organizations, Line configuration, topology, Transmission mode, and categories of networks, Transmission Media: Guided and unguided, Media: Magnetic Media, Twisted-Pair cables, Base band & Broadband Coaxial cables, Fiber Optics, comparison of media.

Unit – II

Analog and digital data transmission. Data and signal, Analog and digital Signaling, Modem, Modulation techniques, CODEC, digital Transmitter, Introduction to Network, OSI reference model, TCP/IP reference model.

Unit – III

Physical and Data Link Layers, Stop-and-Wait Protocol, Sliding Window Protocol, Multiple Access Protocols: ALOHA, CSMA/CD, IEEE Standard 802.3 and Ethernet, 802.4: Token Bus; 802.5: Token Ring.

Unit-IV

Devices: Repeaters, bridges, gateways, routers, The Network Layer; Routing Algorithms, Congesting control Algorithms, Internetworking, The TCP/IP Protocol, IP Addressing, Subnets.

Unit-V

Transport and upper layers in OSI Model: Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

TEXT BOOKS

- Behrouz A Forouzan: Data Communication and Networking, 3rd Edition, Tata McGraw Hill

REFERENCE BOOKS

- Andrew S Tanenbaum: Computer Networks, 4th Edition, Pearson Education
- William Stallings: Data and computer communications, 7th Edition Pearson Education

BCA 401 (INTRODUCTION TO DATABASE MANAGEMENT SYSTEM)

Unit – I

Introduction: Overview of Database Management System, DBMS architecture, Characteristics of database approach, Various views of data, data models, Schemes, data independence, Advantages of DBMS over file processing systems, Responsibility of database administrator, Introduction to Database Languages & Environments.

Unit – II

E-R Modeling: Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

Unit – III

Relational Data Model: Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL. EER and ER to relational mapping: Data base design using EER to relational language.

Unit – IV

Transaction Processing Concepts: Transaction system, testing of serializability, Serializability of schedules, Conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, Checkpoints, deadlock handling

Unit – V

Data Normalization: Functional Dependencies, Normal form up to 3rd normal form. Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version Schemes, Recovery with concurrent transaction.

TEXTBOOKS

- Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts",
- Date C J, "An Introduction To Database System", Addison Wesley.

REFERENCEBOOKS

- Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
- A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.

BCA 402 (INTRODUCTION TO JAVA PROGRAMMING)

Unit – I

Introduction to Java: fundamentals of OOP, Java features, Concepts of Java Virtual machine (JVM), Keywords, Constants and Variables, data types, operators and expressions.

Unit – II

Decision Making: Branching –if else statement, switch statement, the ? : operator; Decision Making: looping-while statement, do while statement, for statement, jumps in loops; Arrays: Creating an array, one and two dimensional array; strings.

Unit – III

Object-Oriented Programming: Class and Encapsulation, Objects, Methods, Default and parameterized Constructors, Inheritance, super and this Keywords, Static Methods, Polymorphism, Overloading, Overriding, Dynamic Method Dispatch, Abstract class, final Keyword, Using Scanner Class for Formatted Input, Universal Superclass Object, Variable Argument List.

Unit – IV

Inheritance: Basic types, super classes, Multilevel hierarchy abstract and final classes, object class, Packages and interfaces, Access protection, extending Interfaces, Exception handling,

Unit – V

Multithreaded programming: Review of fundamentals, Java thread model, synchronization, messaging, thread class, Run able interface, inter-thread communication, Monitors, Deadlock, Producer/ Consumer problems, Wait() and notify(), Performance issues.

TEXTBOOKS

- E Balagurusamy: Programming with Java, Second edition, TMH.

REFERENCE BOOKS

- Patrick Naughton and Herbertz Schidt: Java -The Complete Reference, second Edition.
- Core Java Volume-I and II 2nd edition-Sun MicroSystem.

BCA 501(SOFTWARE ENGINEERING)

Unit – I

Software and Software Engineering: Software characteristics, software crisis, software engineering paradigms. Planning a software project-software cost estimation, project scheduling, personal planning, team structure. Software Development Life-cycle

Unit – II

Software Requirement Analysis: structured analysis, object oriented analysis, software requirement specification, validation.

Unit – III

Design and Implementation of Software: software design fundamentals, design methodology (structured design and object oriented design), design verification, monitoring and control coding.

Unit – IV

Testing: Testing fundamentals, white box and black box testing, software testing strategies: unit testing, integration testing, validation testing, system testing, debugging.

Unit – V

Software Reliability: metric and specification, fault avoidance and tolerance. Software Project Management: Cost estimation; Project scheduling, Staffing, Software configuration management, Quality assurance, Project Monitoring, Risk management, etc. Software Maintenance.

TEXTBOOKS

- Pressman S.Roger, Software Engineering, Tata McGraw-Hill
- Jalote Pankaj, An integrated approach to software engineering, Narosa Publishing House

REFERENCE BOOKS

- Sommerville Ian, Software Engineering, 5th ed., Addison Wesley-2000
- Fairley Richard, Software, Software Engineering Concepts, Tata McGraw-Hill

DEPARTMENTAL ELECTIVES (DE) **BCA DE11 (MANAGEMENT INFORMATION SYSTEM)**

Unit – I

Information System: Definition, Need and types of Information System, Information System in Organisation, Management, Strategy, role of Information System in Organisation, Business Strategy, Decision Making, Management Information System : Meaning and Characteristics.

Unit – II

Implementation, Evaluation and Maintenance of the MIS: Implementation of MIS, steps and methods, Documentation, Evaluation of MIS, structure for evaluation, Maintenance of MIS. Requirements of a successful MIS, Limitation of MIS, Structure of MIS. Levels of MIS, Planning, Forecasting, Control, Modeling, Computing, Database Administration,

Unit – III

Major types of Management Information System, Information Reporting System (IRS), Decision Support System (DSS), Executive Information System (EIS), Knowledge Based System (KBS), Group Discussion Support System (GDSS), Characteristics of GDSS, Relationship of Management Information System and Operation Information System,

Unit – IV

Implementation of MIS for Decision Making, Simon's Model of decision Making, Programmed Vs Non- Programmed Decisions. Planning and Organizing with MIS: Information Planning, need of information for an organization, Steps in process of Strategic Planning, Managing international information system : The growth of international information system, Organising international information system managing global system.

Unit – V

Information technology Infrastructure: Computer hardware & software, system software, Categories of computer and Computer system, Information technology infrastructure, Storage input and output, telecommunication and Networks.

TEXT BOOKS

- R. G. Murdick, J. E. Ross and J. R. Clagget, "Information Systems for Modern Management".
- Obrien, Marakas, and Ramesh Behl, "Management Information systems", TMHG.

REFERENCE BOOKS

- Parker, Charles Case, Thomas, "Management Information System: Strategy & Action", 2nd Edition, TMH.
- Jaiswal and Mittal, "Management Information systems", Oxford University Press.

BCA DE 12 (INTRODUCTION TO WIRELESS COMMUNICATION)

Unit – I

Liberalization of communications Industry, Digitalization of content, changes in spectrum management, cellular reuse, drive towards broadband, Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Unit – II

Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems. Cellular telephony: frequency reuse principle, transmitting, receiving, roaming, GSM network architecture, GSM channel structure, GPRS.

Unit – III

Mobile radio propagation: Free space propagation model, reflection, diffraction, scattering, link budget design, Outdoor Propagation models, Indoor propagation models, Small scale Multipath propagation, Impulse model, Small scale Multipath measurements, parameters of Mobile multipath channels, types of small scale fading, statistical models for multipath fading channels.

Unit – IV

Second Generation and Third Generation Wireless Networks and Standards, WLL, Bluetooth. AMPS, GSM, IS-95 and DECT Satellite networks: orbits, footprint, categories of satellites. Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

Unit – V

Introducing the Mobile Internet: Key Services for the mobile Internet, Business opportunities. WAP: the Mobile Internet Standard: Challenges and Pitfalls, Overview of the Wireless Application Protocol, Implementing WAP Services: The Wireless Markup Language, Enhanced WML: WML Script and WTAI,

TEXT BOOKS

- T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.
- R. Blake, " Wireless Communication Technology", Thomson Delmar, 2003.

REFERENCE BOOKS

- W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
- Stephen G. Wilson, " Digital Modulation and Coding", Pearson Education, 2003.

BCA DE 13(COMPUTER ETHICS)

Unit – I

An overview of ethics, ethics for IT professionals and IT users, Milestones in computer development, Spotting ethical issues; Cyberethics: How law, ethics, and religion intertwine. Are Cyberethics Different?

Unit – II

Professional ethics: definition of a professional, applying professional codes; computer and internet crime, privacy laws.

Unit – III

Freedom of expression, social networking, the impact of IT on the quality of life.

Unit – IV

Intellectual Property Basics: Trade Secrets, Copyrights, Patents, Trademarks,

Unit – V

Ethics of IT Organizations, Responsibility vs. Liability vs. Accountability

TEXTBOOKS

- Michael J. Quinn, Ethics for the Information Age, 2nd edition.

REFERENCE BOOKS

- George Reynolds, "Ethics in Information Technology".

BCA DE14 (E COMMERCE)

Unit – I

Introduction to E-Commerce: Scope, Definition; Electronic Commerce and the Trade Cycle, Traditional vs. Electronic business applications, Electronic Markets, Electronic Data Interchange. Business Strategy in an Electronic Age: Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Advantage using E-Commerce.

Unit – II

Business-to-Business Electronic Commerce: Characteristics of B2B EC, Models of B2B EC, Procurement Management Using the Buyer's Internal Marketplace, Supplier-Oriented Marketplace, Intermediary-Oriented Marketplace, Other B2B Models, Electronic Marketing in B2B, Solutions of B2B EC.

Unit – III

Electronic Data Interchange (EDI): EDI & Business. Intranet and Extranet: Architecture of the Internet, Intranet, and Extranet, Applications.

Unit – IV

Electronic Payment Systems: Electronic Payments & Protocols, Security Schemes in Electronic Payment Systems,

Unit – V

Infrastructure for EC: - components of the I-way - Global information distribution networks - public policy issues shaping the I-way, internet as a network infrastructure. The Future of EC.

TEXT BOOKS

- David Whiteley, "E-Commerce", Tata McGraw Hill, 2000
- Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

REFERENCE BOOKS

- R. Kalakota and A. B. Whinston, Frontiers of Electronic Commerce, Addison Wesley, 1996.
- David Kosiur, Understanding Electronic Commerce, Microsoft Press, 1997.
- Saily Chan, Electronic Commerce Management, John Wiley, 1998.

BCA DE 21(INTRODUCTION TO LINUX OPERATING SYSTEM)

Unit – I

Overview of Linux : What is Linux, Linux's root in Unix, Common Linux Features, advantage of Linux, Overview of Unix and Linux architectures, Linux files system, hardware requirements for Linux, Linux Internals: Introduction, Process management, System Calls.

Unit – II

Linux File system : Logging in, getting familiar with Linux desktop, Basic files attributes – file permissions, changing permissions. listing files and directories commands, navigating file system- pwd, cd, mkdir, rmdir, ls, pr, Handling ordinary files- cat, cp, mv, wc, rm, comm..., amp, diff,

Unit – III

Processes and filters : Simple filters- head, tail, cut, paste, sort, uniq, tr, Regular expression Grep utility, Shell command line, redirection, pipeline, spilt output, tee, and process- System Processes, internal and external commands, background process, premature termination of process, process priorities, process scheduling – (at, batch), nohup command

Unit – IV

Shell Programming : Interactive scripts, Shell variables, assigning values to variables, positional parameters, command line arguments, arithmetic in shell script, exit status of a command, sleep and wait, script termination, simple shell commands.

Unit – V

Decision taking- if else, nested if, file tests, string tests, case control structure. Loop control structure- while, for, IFS, break, continue, \$* and \$@, logical operators & and executing script, Debugging a script, Debugging a script, executing multiple scripts System Administration : Configuration of Linux, Installation of Linux, Connecting to remote machines- ftp, telnet, Adding and removing users.

TEXT BOOKS:

- Silberschatz, P. B. Galvin, "Operating System Concepts", John Wiley & Sons (Asia) Pte. Ltd.
- Neil Mathew, Richard Stones, "Beginning Linux Programming", 3 rd Edition, Wiley Dream Tech.

REFERENCE BOOKS

- B. W. Kernighan & R. Pike, "The UNIX Programming Environment", Prentice Hall of India, 2000
- Cox K., "Red Hat Linux Administrator's Guide", PHI, 2001

BCA DE 22(INTRODUCTION TO MOBILE COMPUTING)

Unit – I

Mobile communication Introduction: mobile computing devices mobile computing function, mobile computing architecture, evaluation of wireless technology (1G, 2G,3G, 4G technology)

Unit – II

PCS and GSM: PCS Architecture, GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS –International roaming for GSM

Unit – III

GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS – Spread Spectrum technology, Third Generation Networks, Applications on 3G

Unit – IV

Wireless Networks: Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX – Wireless Local Loop, Bluetooth

Unit – V

Emerging Mobile Communication Technology: Mobile IP, Cellular IP, VoIP, SIP, LTE, 4G goal and architecture

TEXT BOOKS

- Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education.
- William Stallings, "Wireless Communications and Networks", Pearson Education.

REFERENCE BOOKS

- Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
- Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of
- C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

BCA DE 23 (INTRODUCTION TO ARTIFICIAL INTELLIGENCE)

Unit – I

Overview of A.I: Introduction to AI, Importance of AI, AI and its related field, AI techniques, Criteria for success. Scope of Artificial Intelligence, intelligent agents. Expert systems.

Unit – II

Problem Solving: 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 , Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods.

Unit – III

Game Playing : minimax, alpha-beta pruning. Knowledge:Definition and importance of knowledge, Knowledge representation, Various approaches used in knowledge representation, Issues in knowledge representation

Unit – IV

Knowledge and Reasoning : Building a Knowledge Base : Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

Unit – V

Learning : Overview of different forms of learning, Learning Decision Trees, Neural Networks. Introduction to Natural Language Processing.

TEXT BOOKS

- E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1999.

REFERENCE BOOKS

- D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1999
- Nils J Nilsson , "Artificial Intelligence -A new Synthesis" 2nd Edition (2000), Harcourt Asia Ltd.

BCA DE 31(FUNDAMENTALS OF .NET PROGRAMMING)

Unit – I

The .NET Framework: Introduction, Common Language Runtime, Common Type System, Common Language Specification, The base class library, The .Net Class Library Intermediate Language, Just In Time Compiler, Garbage Collection, Assemblies

Unit – II

C# Basics: Introduction., .Data Type, Identifiers, Variables & Constants, C# Statements, Object Oriented Concepts, Object & Classes, Arrays and Strings, System Collections, Delegates

Unit – III

Developing ASP.NET Applications: Namespace System, Window Forms, C# in Web Application, Web Form Fundamentals, Validation and Rich Controls, Master Pages and Themes

Unit – IV

Working With Data: ADO.NET Fundamentals, Reflection, State Management, Website Navigation

Unit – V

Advanced ASP.NET: Error Handling, Security Fundamentals, Web Services, Unsafe Mode

TEXTBOOKS

- Chakraborti et. al., "Microsoft .NET framework", PHI, 2002
- M. Reynolds et. al., ".NET Enterprise", Wrox/SPD, 2002

REFERENCE BOOKS

- Richard Blaur & Mathew Reynolds, "Beginning VB.net 2003", 3 rd Edition, Wiley Dream Tech., 2003
- Chris Willman, John Kauffman, "Beginning ASP.net 1.1 with VB.NET 2003", Wiley Dream Teach, 2003
- Chris Ullman, John Kauffman, "Beginning ASP.NET with Visual #.net 2003", Wiley Dream Tech, 2003

BCA DE 32 (INTRODUCTION TO CLOUD COMPUTING)

Unit – I

Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS.

Unit – II

Introduction to Cloud Technologies: Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization

Unit – III

Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Introduction to cloud development,

Unit – IV

Issues in cloud computing, Implementing real time application over cloud platform, Issues in Inter-cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Unit – V

Cloud computing platforms, Installing cloud platforms and performance evaluation, Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud

TEXTBOOKS

- *Kai Hwang, Jack Dongarra and Geoffrey Fox*, Morgan Kaufmann, "Distributed and Cloud Computing: From Parallel Processing to the Internet of Things", 2011
- Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper , "Cloud Computing for Dummies" ,Wiley India Edition.

REFERENCE BOOKS

- Anthony T. Velte, "Cloud Computing: A practical Approach", Tata McGraw-Hill, 1st edition.
- Gautam Shroff , "Enterprise Cloud Computing" .

BCA DE 33 (SOFT COMPUTING)

Unit – I

Introduction to Genetic Algorithm: Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

Unit – II

Artificial Neural Networks & Learning : Neural Model and Network Architectures, Perceptron Learning, Supervised Hebbian Learning, Backpropagation, Associative Learning.

Unit – III

Competitive Networks: Hopfield Network, Computing with Neural Nets and applications of Neural Network.

Unit – IV

Introduction to Fuzzy Sets: Operations on Fuzzy sets, Fuzzy Relations, Fuzzy Measures, Applications of Fuzzy Set Theory to different branches of Science and Engineering.

Unit – V

Knowledge discovery in databases: Data mining and web mining using soft computing techniques. Soft computing approaches to information systems project management. Applications of Computational Intelligence.

TEXT BOOKS

- J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearsons.
- S. N. Sivanandam & S. N. Deepa, Principles of Soft Computing, Wiley - India, 2007.

REFERENCE BOOKS

- Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
- Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley.
- S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
- R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston.

BCA DE 41(IMAGE PROCESSING)

Unit – I

Introduction: Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

Unit – II

Image Restoration: Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

Unit – III

Color Image Processing: Color Fundamentals, Color Models, Converting Colorsto different models, Color Transformation, Smoothing and Sharpening, Color Segmentation.

Morphological Image Processing: Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

Unit – IV

Image Segmentation: Boundary detection based techniques, Point , line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation

Unit – V

Image Compression: Encoder-Decoder model , Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation

TEXTBOOKS

- Rafael C. Gonzalez and Richard E. Woods: Digital Image Processing 2nd Edition, Pearsons
- R.J. Schalkoff : Digital Image Processing and Computer Vision, John Wiley and Sons, NY.

REFERENCE BOOKS

- Chanda: Digital Image Processing & Analysis, PHI
- Jain : Fundamentals of Digital Image Processing, PHI

BCA-DE-42 (CRYPTOGRAPHY)

Unit – I

Overview of cryptography: Need of security, cryptographic goals, security approaches, basic terminology and concepts. Classical cryptosystems, Shannon's theory.

Unit – II

Stream ciphers: Classification, one time pad, properties of synchronous and self-synchronizing stream cipher, stream ciphers based on LFSRs and its property. Block ciphers : Modes of operation – ECB, CBC, CFB and OFB mode, exhaustive key search and multiple encryption, classical ciphers – transposition and substitution based ciphers.

Unit – III

Data Encryption Standard algorithm, double and triple DES, IDEA, Advance encryption standard, Public key encryption : Overview of symmetric key cryptography, RSA algorithm, Knapsack encryption algorithm. public key cryptography standard (PKCS), PKI and security.

Unit – IV

Message and Users authentication : One way hash functions, message digest, MD5 algorithm, Users authentication : authentication basics, password, authentication tokens, certificate based authentication, biometric authentication, Kerberos, Single sign on approach.

Unit – V

Digital signature: digital envelope, classification of digital signature schemes – appendix and message recovery, attacks on signature. Key management techniques: simple key establishment models, tradeoffs among key establishing protocols, techniques for distributing confidential key, techniques for distributing public keys, comparison of techniques for distributing public keys, key management involving multiple domains, key management life cycle.

TEXTBOOKS

- William Stallings :Network Security Essentials.
- Douglis Stinson: "Cryptography Theory and Practice", 2nd Edition, Chapman & Hall /CRC

REFERENCEBOOKS

- B. A. Forouzan, "Cryptography & Network Security", Tata Mc Graw Hill .
- W. Stallings, "Cryptography and Network Security", Pearson Educatio

BCA DE 43 (CYBER CRIMES AND CYBER LAWS)

Unit – I

Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy.

Unit – II

E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers,

Unit – III

Introduction to Cyber Crime Investigation, Cyber Forensics, Investigation Tools, e-Discovery, Digital Evidence Collection, Evidence Preservation, Forensics Tools and Softwares, Recovering deleted evidences, Password Cracking etc. ,Cyber Security.

Unit – IV

Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits, Law of Intellectual Property: Copy Right Act, Trade and Merchandise Act, Patent Act, Domain Name Disputes, Cyber-Squatting.

Unit – V

International Perspective of Cyber Law: Electronic Data Interchange ,EDI : Concept and legal Issues. Electronic Signature Law's of Major Countries, Cryptography Laws, Cyber Law's of Major Countries

TEXTBOOKS

- Chris Reed and John Angel: Computer Law, OUP, New York, 2007.
- Justice Yatindra Singh: Cyber laws, Universal Law publishing Co, New Delhi, 2012.

REFERENCE BOOKS

- SK Verma and Raman Mittal:legal dimensions of cyber space, Indian Law Institute, New Delhi, 2004.
- SR Bhansali: Information Technology Act 2000, University book house pvt. ltd., Jaipur.

BCA DE 44 (PATTERN RECOGNITION)

Unit – I

Introduction and mathematical preliminaries - What is pattern recognition?, Clustering vs. Classification; Applications: Linear Algebra, vector spaces, probability theory, estimation techniques.

Unit – II

Classification: Bayes decision rule, Error probability, Error rate, Minimum distance classifier, Mahalanobis distance; K-NN Classifier, Linear discriminant functions and Non-linear decision boundaries. Fisher's LDA, Single and Multilayer perceptron, training set and test sets, standardization and normalization.

Unit – III

Clustering: Different distance functions and similarity measures, Minimum within cluster distance criterion, K-means clustering, single linkage and complete linkage clustering, MST, medoids, DBSCAN, Visualization of datasets, existence of unique clusters or no clusters.

Unit – IV

Feature selection: Problem statement and Uses, Probabilistic separability based criterion functions, interclass distance based criterion functions, Branch and bound algorithm, sequential forward/backward selection algorithms, (I,r) algorithm.Feature Extraction: PCA, Kernel PCA.

Unit – V

Recent advances in PR: Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy.

TEXTBOOKS

- Duda, R.O., Hart, P.E., and Stork, D.G. Pattern Classification. Wiley-Interscience. 2nd Edition. 2001.
- Hastie, T., Tibshirani, R. and Friedman, J. The Elements of Statistical Learning. Springer. 2001.

REFERENCE BOOKS

- Bishop, C. M. Pattern Recognition and Machine Learning. Springer. 2007.
- Theodoridis, S. and Koutroumbas, K. Pattern Recognition. Edition 4. Academic Press, 2008.
- Bishop, C. M. Neural Networks for Pattern Recognition. Oxford University Press. 1995.

OPEN ELECTIVES (OE)
BCA OE 11 (ORGANIZATIONAL BEHAVIOR)

Unit – I

Nature, Scope, Definition and Goals of organizational Behaviour; Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; essential attributes; Psychological dimensions and relevance in the emerging society;

Unit – II

Learning: styles and principles; Skinner, Thorndike and Piaget theories; Conditions of learning; Memory: Short term and long term; Efficient and effective ways in respect of thinking, problem solving and decision making;

Unit – III

Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory, Mc Gregor's Theory 'X' and Theory 'Y'

Unit – IV

Models of personality, factors and desirable features of a healthy personality; Basic Needs and their hierarchy; Mallow model and self actualizing personalities. Work stress: Meaning and definition of Stress, Symptoms of Stress; Sources of Stress, Stress management.

Unit – V

Conflict in organization: Nature of Conflict, Process of Conflict; Levels of Conflict - Intrapersonal, Interpersonal; Sources of Conflict; Effect of Conflict; Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling

TEXT BOOKS

- Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 11th edition.
- Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2001.

REFERENCE BOOKS

- Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9th Edition
- Udai Pareek, Understanding Organisational Behaviour, 2nd Edition, Oxford Higher Education.

BCA OE 22 (CUSTOMER RELATIONSHIP MANAGEMENT)

Unit – I

Customer Relationship Management Fundamentals- Theoretical perspectives of relationship, Evolution of relationship marketing, Stages of relationship, Issues of relationship, Purpose of relationship marketing, Approach towards marketing: A paradigm shift, Historical Perspectives, CRM Definitions, Emergence of CRM practice:, CRM cycle, Stakeholders in CRM, Significance of CRM, Types of CRM, Success Factors in CRM, CRM Comprehension, CRM Implementation

Unit – II

Customer Satisfaction: Meaning, Definition, Significance of Customer Satisfaction, Components of Customer Satisfaction, Customer Satisfaction Models, Rationale of Customer Satisfaction, Measuring Customer Satisfaction, Customer satisfaction and marketing program evaluation, Customer Satisfaction Practices, Cases of Customer Satisfaction

Unit – III

Service Quality: Concept of Quality, Meaning and Definition of Service Quality, Factors influencing customer expectation and perception, Types of Service Quality, Service Quality Dimensions, Service Quality Gaps, Measuring Service Quality, Service Quality measurement Scales

Unit – IV

Customer Relationship Management: Technology Dimensions - E- CRM in Business, CRM: A changing Perspective, Features of e-CRM, Advantages of e-CRM, Technologies of e-CRM, Voice Portals, Web Phones, BOTs, Virtual Customer Representative, Customer Relationship Portals, Functional Components of CRM, Database Management: Database Construction, Data Warehousing, architecture, Data Mining. Characteristics, Data Mining tools and techniques, Meaning, Significance, Advantages, Call Center, Multimedia Contact Center, Important CRM softwares.

Unit – V

Customer Relationship Management: Emerging Perspectives: Employee-Organisation Relationship, Employee-Customer Linkage, Factors effecting employee's customer oriented behavior, Essentials of building employee relationship, Employee customer orientation, Service Failure, Service Recovery Management, Service Recovery Paradox, Customer Life time value, customer profitability, customer recall management, customer experience management, Rural CRM, , customer relationship management practices in retail industry, hospitality industry, banking industry, telecom industry, aviation industry

TEXTBOOKS

- Alok Kumar Rai : Customer Relationship Management: Concepts and Cases (Second Edition)-PHI Learning
- Simon Knox, Adrian Payne, Stan Maklan: Customer Relationship Management- Routledge Inc.

REFERENCE BOOKS

- Kristin Anderson, Carol Kerr : Customer relationship management, McGraw-Hill Professional

BCA OE 14 (OPERATIONS RESEARCH)

Unit – I

Operations Research:- Uses, Scope and Applications of Operation Research in managerial decision-making. Decision-making environments:- Decision-making under certainty, uncertainty and risk situations; Decision tree approach and its applications.

Unit – II

Linear programming: Mathematical formulations of LP Models for product-mix problems; graphical and simplex method of solving LP problems; sensitivity analysis; duality. Transportation problem: Various methods of finding Initial basic feasible solution and optimal solution.

Unit – III

Assignment model: Algorithm and its applications. Game Theory: Concept of game; Two-person zero-sum game; Pure and Mixed Strategy Games; Saddle Point; Odds Method; Dominance Method and Graphical Method for solving Mixed Strategy Game.

Unit – IV

Sequencing Problem: Johnsons Algorithm for n Jobs and Two machines, n Jobs and Three Machines, Two jobs and m - Machines Problems. Queuing Theory: Characteristics of M/M/1 Queue model; Application of Poisson and Exponential distribution in estimating arrival rate and service rate; Applications of Queue model for better service to the customers.

Unit – V

Replacement Problem: Replacement of assets that deteriorate with time, replacement of assets which fail suddenly. Project Management: Rules for drawing the network diagram, Applications of CPM and PERT techniques in Project planning and control; crashing of operations.

TEXTBOOKS

- Apte: Operation Research and Quantitative Techniques.
- Singh & Kumar: Operation Research, UDH Publisher edition 2013.

REFERENCE BOOKS

- Taha Hamdy : Operations Research - An Introduction , Prentice-Hall, 9th edition
- Sharma J K: Operations Research, Pearson, 3rd Edition.

BCA OE 12 (FINANCIAL ACCOUNTING)

Unit – I

Overview : Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India.

Unit – II

Basics of accounting – Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept.

Unit – III

Financial statement analysis: Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement, simple problem, Cash flow analysis, Concepts, uses, preparation of cash flow statement, simple problem, Break – even analysis.

Unit – IV

Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.

Unit – V

Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management – Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts. Cash Management, Inventory Management and Receivables Management.

TEXTBOOKS

- Maheshwari & Maheshwari, "An Introduction to Accountancy", 8th Edition, Vikas Publishing
- Gupta R.L., Gupta V.K., "Principles & Practice of Accountancy", Sultan Chand & Sons, 1999.

REFERENCE BOOKS

Maheshwari S.N., "Principles of Management Accounting", 11th Edition, Sultan Chand & Sons.

BCA OE 23 (MANAGING AND MARKETING TECHNOLOGY)

Unit – I

Core Concepts of Marketing: Concept, Meaning, definition, nature, scope and importance of marketing, Approaches to Marketing: Product , Production , Sales, Societal, Relational. Concept of Marketing Myopia, Holistic Marketing Orientation, Customer Value, Adapting marketing to new liberalised economy - Digitalisation, Customisation, Changing marketing practices.

Unit – II

Market Analysis and Selection: Nature and Contents of Marketing Plan, Marketing environment, Controllable and Uncontrollable factors effecting marketing decisions, Analyzing latest trends in Political, Economic, Socio-cultural and Technical Environment, Concept of Market Potential & Market Share, Concept, Characteristics of consumer and organizational markets, Buyer Behavior, concept of market segmentation, Evaluating & Selecting, Target Markets, Concept of Target Market, Positioning and differentiation strategies, Concept of positioning – Value Proposition & USP, Marketing Information System, Strategic marketing planning and organization.

Unit – III

Product Decision- Concept of a product; Classification of products; Major product decisions; Product line and product mix; Branding; Packaging and labeling; Product life cycle – strategic implications; New product development and consumer adoption process.

Unit – IV

Price Decision- Concept, and Meaning of Price and Pricing, Significance of Pricing Decision, Factors affecting price determination; Pricing Methods and Techniques, Pricing policies and strategies; Discounts and rebates.

Unit – V

Place Decision- Nature, functions, and types of distribution channels; Distribution channel intermediaries; Channel management decisions, Marketing channel system - Functions and flows; Channel design, Channel management - Selection, Training, Motivation and evaluation of channel members; Promotion Decision-Communication Process; Promotion mix – advertising, personal selling, sales promotion, publicity and public relations; Media selection; Advertising effectiveness; Sales promotion – tools and techniques.

TEXTBOOKS

- Philip Kotler-Agnihotri : Principle of marketing, Pearson Education
- Ramaswamy V.S. and Namakumari S - Marketing Management: Planning, Implementation and Control , Macmillian, 3rd Edition.
- Rajan Saxena: Marketing Management, Tata McGraw Hill.

REFERENCE BOOKS

- R Kumar& Goel: Marketing Management, UDH Publishers, edition 2013.
- Stanton William J - Fundamentals of Marketing , TATA Mc Graw Hill.
- Etzel M.J., Walker B.J. and Stanton William J - Marketing concept & Cases special Indian Edition Tata Mc Graw Hill, 13th Edition.