Binod Bihari Mahto Koyalanchal University, Dhanbad

COURSE STRUCTURE
CHOICE BASED CREDIT SYSTEM

The proposed CBCS system has the potential of providing a choice of a wide spectrum of subjects/branches of subjects to students in pursuit of achieving their cherished goals. This system has been globally accepted and now has become the need of the day. The UGC also has provided guidelines to the Universities for consideration and implementation of CBCS.

The following courses and credits to be initiated at Bachelor of Computer Application (BCA) w.e.f. the session 2021–24. The proposed system may be modified/improved in future according to the requirements.

CORE Papers for BCA

Semester – I

Paper Code	Title	Credit	Marks
BCA F1001	Business Communications	4	100
BCA F1002	Basic Mathematics-I	5	100
BCA F1003	Business Practices And Management	4	100
BCA C1004	Introduction to Computer Science	4	100
BCA C1005	Problem Solving and Programming in C	5	100
Sessional			
BCA P1006	Computer Basics and PC Software Lab	1	50
BCA P1007	C Programming Lab	1	50
BCA P1008	Communication Skill Lab	1	50

Semester – II

Paper Code	Title	Credit	Marks
BCA F2001	Basic Mathematics II	4	100
BCA F2002	Environmental Science	4	100
BCA C2003	Database Management System	5	100
BCA C2004	Object Oriented Programming using C++	5	100
BCA C2005	Logic Design	4	100
Sessional			
BCA P2006	C ++ Programming Lab	1	50
BCA P2007	Database Management System Lab	1	50
BCA P2008	Circuit design Lab	1	50

Semester – III

Paper Code	Title	Credit	Marks
BCA C3001	Data Structure using C	5	100
BCA C3002	Java Programming	4	100
BCA C3003	Computer Architecture	5	100
BCA C3004	System Analysis and Design	4	100
BCA C3005	Probability and Statistics	4	100
Sessional			
BCA P3006	Data Structure Lab	1	50
BCA P3007	Java Programming Lab	1	50
BCA P3008	Statistical Lab	1	50

Semester – IV

Paper Code	Title	Credit	Marks
BCA C4001	Android Programming	4	100
BCA C4002	Operating System	5	100
BCA C4003	HTML	4	100
BCA C4004	Visual Programming	4	100
BCA C4005	Computer Networks	5	100
Sessional			
BCA P4006	Android Programming Lab	1	50
BCA P4007	Visual Programming Lab	1	50
BCA P4008	HTML Lab	1	50

Semester – V

Paper Code	Title	Credit	Marks
BCA C5001	Internet Concept and Web Design	4	100
BCA C5002	Design and Analysis of Algorithms	5	100
BCA C5003	Python Programming	5	100
BCA C5004	Computer Oriented Numerical Methods	4	100
	Elective – I	4	100
Sessional			
BCA P5005	Internet Concept and Web Design Lab	1	50
BCA P5006	Numerical Method Lab	1	50
BCA P5007	Python Programming Lab	1	50

Semester – VI

Paper Code	Title	Credit	Marks
BCA C6001	Optimization Techniques	4	100
BCA C6002	Principle of Management	4	100
BCA C6003	Linux Programming	5	100
BCA C6004	Network Security	5	100
	Elective – II	4	100
Sessional			
BCA C6005	Project	2	100
BCA C6006	Linux Programming Lab	1	50

Elective – I	*Elective – II*
BCA E5008- E – Commerce	BCA E6007- Management Information System
BCA E5009 -Software Testing	BCA E6008 -Artificial Intelligence
BCA E5010 -Multimedia	BCA E6009 -Software Engineering

Grade Point

The Cumulative Grade Point Average (CGPA) will be calculated on the 10 point grading scale as follows:

Grade Point	Parentage of Marks	Grade Symbol (Letter)
10	91 – 100	O (Outstanding)
09	81 –90	A+ (excellent)
08	71 –80	A (Very Good)
07	61 –70	B+ (Good)
06	51 –60	B (Above Average)
05	41 –50	C (Average)
04	40	P (Pass)
00	Below 40	F (Fail or Absent)

A. For each Semester:

Semester Grade Point Average (SGPA)

$$S(j) = \frac{\sum_i C(i).G(i)}{\sum_i (i)} \qquad (i)$$

Where C(i) denotes the total credits of the ith course. G(i) denotes the grade point earned by a student in i^{th} course and j indicates the semester.

B. For full course

Cumulative Grade Point Average CGPA= $\frac{\sum_j (j).S(j)}{\sum_j (j)}$ $\qquad (ii)$

Where C(j) denotes the total credits of the jth semester. S(j) denotes the SGPA of the jth semester.

BINOD BIHARI MAHTO KOYALANCHAL *UNIVERSITY*, DHANBAD
REGULATIONS
FOR
BACHELOR OF COMPUTER APPICATION (BCA)

(A) Preamble
1. The regulations herein specified applied to Bachelor of Computer Applications (BCA) programme offered by the Binod Bihari Mahto Koyalanchal University, Dhanbad.
2. The BCA programme covered by these regulations is correlated courses of study, the successful completion of which would enable the participants of the programme to qualify for the award of BCA degree.
3. A participant of the programme is a student who is duly admitted to an institute of the university and who has registered himself/herself for a course of study and attains the same.

(B) Time scale for academic activity
1. The basic units of time for academic activity for the BCA programme shall be a semester (July to December and January to June). A basic contact period is one in which a teacher engages the student for a duration of 60 minutes.
2. If circumstances warrant, the department may schedule a summer programme during long vacation of the department. There will be in general no formal classes in the summer programme.

(C) Courses of study
The university shall offer courses during a semester indicated mainly from consideration of minimum enrollment and facilities available. The competent authority comprising of the University/Department shall have the right to cancel any or all course of study if the requirements are not satisfied.

(D) Registration for course of study
1. Every participant of the BCA programmes, shall first register himself/herself for the courses of study he/she intends pursuing provided he/she possesses the minimum qualifications as laid down and his/her plan is approved by the University .
2. Fees payable by the participants including fees payable for examination shall be as laid down in administrative instructions issued from time to time by the University/Department for the purpose.

(E) Audit of the courses
All courses offered in the BCA programme will be open for audit in the spirit of offering an opportunity for continuing education for the participants who wish to refresh or update their knowledge. Audited courses shall neither count for academic credit nor there be any examination requirements. Participants shall be eligible to participate in the courses offered on payment of prescribed fee and due registration.

(F) Measurement of Academic Achievement of the participating student in the BCA programme shall be measured in terms of grade obtained by him/her in the examinations. The overall performance of the students in the semester examination shall be evaluated in terms of grade point average as specified later.

(G) Assessment:

In total 150 credits represent the workload of a session for BCA program.

Total credits=150, 1 credit = 15 lecture Hrs, 100 Marks SUBJECT(L-T-P) = (4-1-0) CREDITS and SESSIONAL (L-T-P) = (0-0-1) CREDITS

Semester	–	I	25 credits
Semester	–	II	25 credits
Semester	–	III	25 credits
Semester	–	IV	25 credits
Semester	–	V	25 credits
Semester	–	VI	25 credits

(H) Scheme of Instruction:

The scheme of instruction in Under-Graduate Programme shall be of the following forms of academic activity:
a) Theory
b) Sessional
c) Practical Training and Project Work
d) Seminar and Tutorial

a) Theory
A theory type of academic activity shall involve concepts, fundamental ideas, and techniques, as laid down in text books or literature and which can be grasped through lectures and assignments. A theory type of course with about 60 contact periods in a semester shall enable participating student to earn one unit of academic credit provided that he/ she fulfils the attendance, and grade requirements as specified herein after.

b) Sessional
The following type of academic work will be covered in sessional:
a) Laboratory Experiment
b) Design Exercise
c) Project
d) Term paper or any other academic work, the purpose of which would be to train the student by practice, repeated use and hands on experience.

A sessional course of 2 contact periods a week and about 30/40 contact period during a semester shall enable a participating student to earn one unit of academic credit provided that he/she fulfils the attendance and grade requirements as specified hereinafter.

c) **Practical Training and Project Work:**

At the end of the sixth semester of study, a student will be examined in the course" Project Work".

1. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others.
2. Students should take guidance from an internal guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Head of the Institute by April. Every student should also submit at least 2 typed copies of their project synopsis.
3. The project proposal should be prepared in consultation with your guide. The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken.
4. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, Tools / Platform, Hardware and Software Requirement specifications, Modules and Process logic of each Module, output reports should be included.
5. The project Report must contain the following: Approved Synopsis, Guide's Biodata, Introduction, Objectives, Tools/Platform, Analysis Document, Design Document, Program Code, Testing, Input / Output Screen, Cost Benefit Analysis, Limitation, Future Scope and Bibliography.
6. The project report will be duly accessed by the internal guide of the subject and marks will be communicated by the Head to the University along with the marks of the internal credit for theory and practical to be communicated for all other courses.
7. The project report should be hard bound; should consist of a Contents page, Certificate of originality; all pages of report should be numbered; content should be well organized in a meaningful manner; printouts of text & screen layouts.
8. The Project Report may be about 50 to 80 double spaced A-4 size typed pages (excluding program code). However,10% variation on either side is permissible.
9. The project work carry 30 marks for internal assessment and 70 marks for external viva. The external viva shall be conducted by a minimum of one external examiners.
10. Project work can be carried out in the Institute or outside with prior permission of the Institute.
11. Project viva-voce by the University panel will be conducted in the month of May.

(I) Attendance Requirement

All students must attend every lecture, practical classes and other activities of the Department. However, the attendance requirement will be a minimum of 75% of the classes actually held.

Absence during the semester

a. A student must inform the HOD concerned immediately of any instance of continuous absence from classes.
b. A student who is absent due to illness should approach the teachers concerned for make up quizzer, assignment and laboratory work.
c. A student has been absent from a sessional test due to illness approach the teacher concerned for make up test immediately on return to class. The request should be supported with a medical certificate issued by a registered medical practitioner.
d. If a student is continuously absent from the institute for more than four weeks without permission of the head of the department concerned, his/her name will be removed from institute rolls.

(J) Examination Assessment

1) The examination of each paper shall have two components- External evaluation (End Semester Exam) at the end of the semester carrying 70 marks to be conducted by the university and Internal evaluation of 30 marks to be evaluated by Teachers. Internal evaluation shall comprise written exam carry 20 marks of a paper. Seminars/Cultural activities/NSS be 5 marks and 5 marksfor assignment.

   Theory Paper -------------- 70 marks + 30 marks

   70 marks --------------------External evaluation (End Semester Exam)

   30 marks -------------------- Internal evaluation

2) Sessional Exam -------------50 Marks

   There should be an university examination for each sessional Paper.

3) Question Paper Pattern:

   The questions papers shall be set and the answer –scripts shall be evaluated by the teachers of the concerned courses. The question paper shall consists of two sections: A & B. Section A will have 08 long questions from the entire units of the syllabus, out of which 04 questions will be required to be answered and will carry 10 marks each. Section B will consists of 10 short answer type questions which will cover the entire syllabus uniformly and will carry 30 marks in all, each short-answer type questions carrying 3 marks. The candidates are required to give answer of each short type question in 50 words i.e 7-10 lines.

(K) Student Discipline

Every student is required to observe a polite and disciplined behavior both inside and outside the campus and should not indulge in any activity which would tend to bring down the prestige of the institute or disturb the peaceful and congenial environment of the campus.

An act of indiscipline on the part of the student may result into adequate discredit and a mention in his/her academic grade card and/or transcript.

Note: The department in consultation with the university shall have the right to change/modify any regulation or part thereof in the academic interest of the students.

(L) Duration of Curriculum and Calendar:

1. Bachelor of Computer Applications (BCA) programme is of three years duration. Each year shall be divided into two semesters. First semester shall ordinarily being in July and end in December. Second semester shall ordinarily being in January and end in June.

2. Each year, the university shall draw an academic calendar and the same shall be non negotiable and strictly adhered to the academic calendar for the first year shall be handed over to each admitted student along with his/her university registration card. Second year academic calendar shall be made available during registration for third semester and third year calendar during registration for fifth semester.

3. The curriculum and syllabus shall be modified with approval of the academic council ordinarily once in every three years to keep the same up-to-date. However, minor modifications can be done as and when necessary with the approval of Vice-Chancellor. The modification so done shall be placed to the immediate next academic council meeting for rectification.

4. A candidate may be permitted to complete BCA degree requirements in not more than 5 years i.e. maximum in 10 semesters.

(M) Eligibility Criteria For Admission:-

1. A candidate will be eligible to join First Semester of BCA Course, if he/she has passed 10+2 examinations or Intermediate or any other equivalent examination with a minimum of 45% aggregate in any discipline (Arts/Commerce/Science) with mathematics/Business Mathematics/Computer Science/Information Practices(I.P.)/Information technology (IT)/Statistics as one of the subjects. Also the candidate should have scored the passing marks in qualifying paper.
2. At the time of the counseling candidates will be required to show their original certificates and marksheet of 10+2/Intermediate or equivalent, caste certificate and any special category certificate, if any and other relevant document

(N) Eligibility for Appearing in Semester Examination

1. A student shall be eligible in an examination provided he/she pursues a regular course of study and attends at least 75% of class in each theoretical and sessional subject during the semester. The attendance shall be considered from the date of admission of the candidate in the institution.
   Attendance record will be compiled at the time of each test and the students with poor attendance will informed through notification. The guardian will also be informed through a letter before he/she is debarred for appearing university examination due to shortage of attendance.
2. Concessions: A student who has been absent for short periods on medical ground or due to participation in cultural, sports, other academic/official assignments in the interest of the Department/University with prior written permission of the head of the institution shall be permitted a maximum of additional concession of 10% in attendance and shall be eligible for appearing in examination with a minimum 65% of attendance in semester.
3. A student shall be admitted to any examination in a subject only if he/she has been registered for that subject.
4. A candidate shall be allowed in an examination only if he/she is issued an admit card for the relevant examination by the University/Department.

(O) PROMOTION

As per rules and regulation of the University

(P) Final Result

The Cumulative Grade Point Average (CGPA) will be calculated on the 10 point grading scale as follows:

Grade Point	Parentage of Marks	Grade Symbol (Letter)
10	91 – 100	O (Outstanding)
09	81 –90	A+ (excellent)
08	71 –80	A (Very Good)
07	61 –70	B+ (Good)
06	51 –60	B (Above Average)
05	41 –50	C (Average)
04	40	P (Pass)
00	Below 40	F (Fail or Absent)

For each Semester:

Semester Grade Point Average (SGPA)

$$S(j) = \frac{\sum_i C(i).G(i)}{\sum_i (i)} \qquad \text{(i)}$$

Where C(i) denotes the total credits of the ith course. G(i) denotes the grade point earned by a student in i^{th} course and j indicates the semester.

For full course:

Cumulative Grade Point Average CGPA$= \dfrac{\sum_j (j).S(j)}{\sum_j (j)} \qquad \text{(ii)}$

Where C(j) denotes the total credits of the jth semester. S(j) denotes the SGPA of the jth semester.

Other:

a) Other provisions not covered under the present regulation shall be governed be the regulation for BACHELOR Examination in Arts, Science and Commerce of the University and may, if needed be reviewed.

b) Any dispute or case not covered under the above regulations shall be referred to the Vice Chancellor whose decision shall be final.

BUSINESS COMMUNICATION (ENG F1001)

TIME-3 hr **FULL MARKS-70** **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Communication Overview

Introduction to Communication, Development of Communication, Principles of Communication, Process of Communication, Barriers to Communication, The Ten Commandments, The Listening Process, Difference between Listening and Hearing, Types of Listening, Deterrents to the Listening Process, Factors that help in Listening. **[Q-2]**

Unit 2: Grammar and Comprehension

Syntax-Use of Articles in Science, The Verbs, The Prepositions, Tense, Active and Passive Construction, Common Errors, Double blanks in a Sentences, Sentence Rearrangement, Closure Test, Antonyms and Synonyms, Comprehensions. **[Q-2]**

Unit 3: Business Correspondence

Drafting official and business letter, Circulars and official order instruction, Drafting minutes and agenda of the meeting, Formal report, Paragraph Writing, Use of Charts, Graphs and Table. **[Q-2]**

Unit 4: Employment Communication

Resumes and Cover Letters: Introduction, Writing a Resume, Writing Job Application Letters, Other Letters about Employments, Effective Presentations, Steps to a Successful Presentation.
[Q-1]

Unit 5: Group Discussion and Interviews

Introduction to Group Discussion, Qualities looked for GD, Strategies for GD, Use of persuasive strategies including some rhetorical devices(for emphasizing for instance being polite and firm handling question and taking in criticism of self), Effective interview, Enrichment of English Vocabulary-Borrowing, Words formation and its methods. **[Q-1]**

TEXT BOOK:
1. Effective Communication Skills: The Foundations for Change by John Nielsen

REFERENCE BOOKS:
1. Business Correspondence & Report Writing, Sharma, TMH Pub.

2. Business Communication, Kaul, PHI Publication.

BASIC MATHEMATICS-I (BCA F1002)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Differential Calculus

Successive differentiation, Leibnitz Theorem, Taylor's theorem with Lagrange's forms of remainders, Expansion of a function of one variable in Taylors and Meclanrin's infinite series. Maxima and Minima of one variable, partial Derivatives, Euler's theorem, change of variables, total differentiation, Errors and approximation. Taylor's series in two variables. Maxima and Minima of two or more variables.
[Q-3]

Unit 2: Integral Calculus

Definite integral and its application for area, length and volume. Multiple integrals. Change of order of integration. Transformation of integral from Cartesian to polar. Applications in areas, volume and surfaces. **[Q-3]**

Unit 3: Differential Equation

First degree and first order Differential equation: Higher order differential equation with constant coefficients. Linear partial differential equation of first order P.D.E. of higher with constant coefficients.
[Q-2]

TEXT BOOKS:

1. Das BC and Mukherjee, Differential Calculus, Calcutta, U.N. Dhar Publishers.
2. Das BC and Mukherjee, Integral Calculus, Calcutta, U.N. Dhar Publishers.
3. Grewal B.S., Higher Engineering Mathematics, Delhi Khanna Publishers.

BUSINESS PRACTICES AND MANAGEMENT (BCA F1003)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Concepts of Business

Business Environment- Macro and Micro Environment, Business System, Forms of Business Organization - Sole trader, Partnership, Companies HUF and Co-operative organization. **[Q-2]**

Unit 2: Organization structure

Meaning and importance, Nature and Types of Organization, Forms of Organization, Formal and Informal Organization, Line and staff Agency, Theories of Organization- Human Relations theory, Bureaucratic theory. **[Q-2]**

Unit 3: Management

Meaning, definition and importance, Management concept, functions, Principles of management and Management Process. Planning- concepts and its types, Decision making concept, Management by objectives (M.B.O.). Motivation-Concepts and theories, Leadership- Concepts and styles. **[Q-2]**

Unit 4: Organizing

Concepts, Nature and Significance, Authority and responsibility, Centralization and Decentralization, CommunicationNature, Process and types of communication networks. Managerial control - concepts and Process, Techniques of control. **[Q-2]**

Text Book:

1. Sharma Sudhir and Bansal, "Principles of Management", Anamika Publishers.

Reference Books:

1. Sharma, R. K. and Gupta, S. K., "Business Organisation and Management", Kalyani Publishers.
2. Sharma, N. K., "Current issues in Management", Indus Valley Publication.
3. Singh, U.K. and Dewan J.M., "Business Management", Management Executives Handbook Series.
4. Michael A. Hitt, Black, J. Stewart, "Management", Pearson Education.

INTRODUCTION TO COMPUTER SCIENCE (BCA C1004)

TIME-3 hr   FULL MARKS-70   CREDIT- 4

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Introduction to Computers & Number Systems and Logic Gates
Introduction, Characteristics of Computers, Evolution of computers, Generation of Computers, Classification of Computers, The Computer System, Applications of Computers.
Introduction, Number Systems, Conversion between Number Bases, Arithmetic System, Signed and Unsigned Numbers, Concept of Overflow, Binary Coding, Logic Gates, Boolean algebra. **[Q-2]**

Unit 2: Computer Architecture & Primary Memory
Introduction, Central Processing Unit (CPU) Memory, Communication between Various Units of a Computer System. Introduction, Memory Hierarchy, Random Access Memory (RAM), Types of RAM, Read Only Memory (ROM), Types of ROM.   **[Q-1]**

Unit 3: Secondary Storage, Input & Output Devices
Introduction, Classification of Secondary Storage Devices, Magnetic Tape, Magnetic Disk, Optical Disk, Magneto Optical disk. Introduction, Keyboard, Pointing Devices, Speech Recognition, Digital Camera, Scanners, Optical Scanners. Introduction, Classification of Output, Hard Copy Output Devices, Printers, Plotters, Computer Output Microfilm (COM), Soft Copy Output Devices, Monitors, Audio Output, Projectors, Terminals.   **[Q-1]**

Unit 4: Computer Software & Operating System
Introduction, Software: Definition, Relationship between Software and Hardware, Software Categories, System Software, Application Software, Software Terminology. Algorithm, Flowchart, Pseudocode (P-Code), Evolution of Programming Languages, Classification of Programming Languages, Generations of Programming Languages, Operating System, Evolution of Operating System, Types of Operating System, Functions of an Operating System, Modern Operating Systems. **[Q-2]**

Unit 5: Data Communication, Computer Network & Internet Basics
Introduction, Data Communication, Transmission Media, Computer Network, Network Topologies, Communication Protocols, Network devices. Evolution of Internet, Basic Internet Terms, Getting Connected to Internet, Internet Applications, Electronic Mail: An Introduction How E-Mail Works, Searching the Web (Search Engines), Languages of Internet, Internet and Viruses. **[Q-2]**

TEXT BOOK:
1. Introduction to computer Science, ITL Education solution Limited, R&D Wing,PEARSON Education, Edition 2004

REFERENCE BOOK:
1. Rajaraman V. – Fundamental of Computers, Prentice Hall of India Pvt. Ltd., New Delhi – 2nd edition, 1996.

PROBLEM SOLVING AND PROGRAMMING IN C (BCA C1005)

TIME-3 hr　　　　　　**FULL MARKS-70**　　　　　　**CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: Introduction
History and Importance of C, Sample programming, Basic Structure and execution of C programs, Constants, Variables, and Data Types and various type of declarations, Different type operators and Expressions, Evaluation of Expressions, Operator Precedence and Associability, Mathematical Functions. **[Q-1]**

UNIT 2: Operators, Decision Making& Branching, Array and String
Managing Input and Output operations, Decision Making and Branching Decision Making and Looping. One – dimensional Arrays and their declaration and Initializations, Two-dimensional Arrays and their initializations, Multidimensional Arrays, Dynamic Arrays, String Variables, Reading and Writing Strings, Arithmetic Operations on characters, Putting Strings together, Comparison of Two Strings, String – handling functions, Table and other features of Strings.

[Q-2]

UNIT 3: Function
 Need and Elements for user –defined Functions, Definition of Functions, Return values and their types, Function calls and Declaration, Arguments and corresponding return values, Functions that return multiple values, Nesting of functions, Recursion, Passing arrays and strings to functions, The Scope, Visibility and Life time of variables. **[Q-2]**

UNIT 4: Structure & Union

Defining Structure, Declaring Structure Variable and Accessing Structure Members, Initialization of Structure, Comparing Structure Variables, Operation on Individual Members, Arrays of Structures, and Structures within structures, Structures and Functions, Unions, Size of Structures, Bit Fields. **[Q-1]**

UNIT 5: Pointer
Understanding Pointers, Accessing the Address of a Variable, Declaration and Initialization of Pointer Variables, Accessing a Variable through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays, Pointers and Character Strings, Arrays of Pointers, Pointers and Function Arguments, Functions Returning Pointers, Pointers to Functions, Pointers and Structures, File Management in C. **[Q-2]**

TEXT BOOK:
1. E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi ; 2004

REFERENCE BOOK & WEBSITE:
1. Programming with C, B.S.Gottfried (TMH)
2. Y. Kanetkar – Let us C, 4th Edition, BPB Publication , New Delhi; 2002
3. www.spoken-tutorial.org, spoken tutorial IIT Bombay

COMPUTER BASICS & PC SOFTWARE LAB(BCA-P1006)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Computer Basics & PC Software lab will be from the theory classes of BCA C1004.

C PROGRAMMING LAB (BCA P1007)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of C Programming lab will be from the theory classes of BCA C1005

COMMUNICATIONS SKILLS LAB (BCA P1008)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of communication skill lab will be from the theory classes of BCA F1001.

BCA-F2001 BASIC MATHEMATICS-II (BCA F2001)

TIME-3 hr　　　　　　**FULL MARKS-70**　　　　　　**CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: ABSTRACT ALGEBRA
Group, Subgroups, Ring, Integral Domain, Field and Introduction of Boolean algebra. **[Q-2]**

UNIT 2: LINEAR ALGEBRA
Spaces and Subspaces, Basic and Dimension of Vector Spaces, Linear Transformation, Their Nullity and Rank.　　**[Q-2]**

UNIT 3: MATRIX ALGEBRA
Elementary Transformation, Inverse of a Matrix by Row Operation, Rank, Solution of a System of Linear Simultaneous Equation by Matrix Methods, Eigen Values and Eigen Vectors, Quadratic Forms. **[Q-2]**

UNIT 4: ANALYTICAL GEOMETRY OF 3-DIMENSIONS
Rectangular, Spherical, Polar and Cylindrical Coordinates, Direction Cosines, Planes, Straight Lines, Shortest Distance Between Two Skew Lines, Sphere. **[Q-2]**

TEXT BOOKS:

1. "Modern Algebra" By A.R.Vasishtha. Krishna Prakashan Media (P) LtdMeerut.
2. "Matrices" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.
3. "Analytical Geometry of the Dimensions" By Dasguta Prasad, BhartiBhawan
4. "Advanced Course in Modern Algebra" By Prof Dr.K.K.Jha, New BharatPrakashan Delhi- 6.
5. "Krishna Series" Analytical Geometry of three Dimensions" By A.R.Vasishtha.
Krishna Prakashan Media (P) Ltd Meerut.

BCA – F2002 ENVIRONMENTAL SCIENCE (BCA F2002)

TIME-3 hr   FULL MARKS-70   CREDIT-4

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT – 1: ENVIRONMENTAL AWARENESS, ECOLOGY AND ENVIRONMENT:

Multidisciplinary nature of environmental science, Definition, scope, importance and need for public awareness. Concept of an ecosystem, structure and function of an ecosystem, producer, consumer and decomposer, energy and nutrient flow biogeochemical cycles, food chain, food web, ecological pyramid.
[Q-2]

UNIT – 2: ENVIRONMENTAL POLLUTION

Segments of environment, sources, pathways and fate of environmental pollutants, causes of environmental pollution, physical, chemical, and biological transformation of pollutants, population explosion, environment and human health, human rights, value education, women and child welfare.
 [Q-2]

UNIT – 3: AIR POLLUTION

Various segments of atmosphere and their significance, classification of air pollutions, toxic effects, sampling and analysis, stationary and mobile emission, sources and their control, photochemical smog, sulphurous smog, green house effect, global warning, ozone depletion, Air (prevention and control of pollution) Act.   **[Q-2]**

UNIT – 4: WATER POLLUTION

Water resources sources of water pollution, various pollutants, their toxic effect, portability of water, municipal water supply, disinfection, characteristics of waste water, primary and secondary waste water treatment, BOD and COD measurement and their significance, rain water harvesting, water shed management, Water (pollution and control) Act. **[Q-2]**

TEXT BOOK
1. De A. K., Environmental Chemistry, Wiley Eastern Ltd.

RECOMMENDED BOOKS:

1. Miller T.G.Jr., Environmental Science, Wadswarth Publishing Co. (TB)
2. Sharma B.K., 2001, Environmental Chemistry, Goel Publishing House, Meerut
3. Odem, E.P., 1971, Fundamentals of Ecology, W.B.Sannders Co. U.S.A.

DATABASE MANAGEMENT SYSTEM (BCA C2003)

TIME-3 hr **FULL MARKS-70** **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1:
Introduction to Databases. Database Management system, Need for DBMS-the file based system, Limitations of file based system, the Database Approach, The Logical DBMS architecture-three level architecture of DBMS, the need for three levels architecture. Physical DBMS Architecture-DML precompiler, DDL compiler, File Manager, Database Manager, Query Processor, Database Administrator, Datafiles indexes & Data Dictionary. **[Q-2]**

Unit 2:
Data Models- Relational, Network, Hierarchical, ER Model. Relational Model-Domain,Attributes, Tuple and Relation, Keys of the relations-primary key, foreign Key, candidate key, alternate key, composite key. Relational Constraints-Domain, Key and Integrity constraints. Relational algebra-Basic set Operation (UNION, INTERSECTION, SET DIFFERENCE, Cartesian Product), Relational operations- SELECT, PROJECT, JOIN, DIVISION. **[Q-2]**

Unit 3:
ER Model- Entities, Attributes and their types, Relationship and Relationship sets, Degree, Cardinality, ER-Diagrams, Enhanced feature of ER Model- Specialization, Generalization and Aggregation. Codd's rules, Relational Schemas, Functional Dependency, Database Integrity, Normalization (1NF, 2NF, 3NF, BCNF). **[Q-2]**

Unit 4:
Transaction concept, States of Transaction, ACID properties, Conflict & View serializability, Lock base protocols, Two phase locking, Deadlock handling, Deadlock prevention, detection and recovery scheme. **[Q-1]**

Unit 5:
SQL, Categories of SQL Commands, Views, constraints, types of constraints, Integrity constraints (Entity Integrity Constraint and Referential Integrity Constraint), SQL: data definition,aggregate function, Null Values, nested sub queries, Joined relations. **[Q-1]**

.
TEXT BOOKS:
1. Fundamental of Database Systems- Elmasri Navathe- Pearson Education Asia

2. Database- Principles, Programming and Performance- Parick O' Neil Elizabeth O' Niel, ^{Harcort} Asia PTE Limited

REFERENCES BOOKS:
1. An Introduction to Database Systems- C. J.Date, Addison Wesley, Pearson Education Press
2. Database System Concepts- Abraham Silberschat, Henry F. Korth, S.Sudarshan Tata McGraw Hill.

OBJECT ORIENTED PROGRAMMING USING C++ (BCA C2004)

TIME-3 hr   FULL MARKS-70   CREDIT-5

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION, BASIC TERMS AND IDEAS

Introducing Object – Oriented Approach, Relating to other paradigms {Functional, Data decomposition}.Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators. **[Q-2]**

UNIT 2: CLASSES AND OBJECTS

Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, Constructors and destructors, instantiation of objects, C++ garbage collection, dynamic memory allocation, Abstract classes. **[Q-2]**

UNIT 3: INHERITANCE AND POLYMORPHISM

Inheritance, Class hierarchy, derivation – public, private & protected, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, **[Q-2]**

UNIT 4: GENERIC FUNCTION, FILES AND EXCEPTION HANDLING

Template function, function name overloading, overriding inheritance methods, Run time polymorphism, Multiple Inheritance. Streams and files, Namespaces, Exception handling, Generic Classes. **[Q-2]**

TEXT BOOK:

1. E. Balaguruswamy, "Object Oriented Programming using C++", TMH, 2017.

REFERENTIAL BOOKS & WEBSITE:

1. A.R.Venugopal, Rajkumar, T. Ravi hanker "Mastering C++", TMH, 1997**.**
2. S.B.Lippman & J.Lajoie, " C++ Primer", 3rd Edition, Addison Wesley, 2000.The C
   programming Lang., Person Ecl – Dennis Ritchie
3. R.Lafore, "Object Oriented Programming using C++", Galgotia Publications, 2004
4. D.Parasons, "Object Oriented Programming using C++", BPB Publication.
5. www.spoken-tutorial.org, spoken tutorial IIT Bombay

LOGIC DESIGN (BCA C2005)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: BOOLEAN ALGEBRA AND LOGIC GATES

Digital Systems, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic. Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Ot, Digital Logic Operations, Digital Logic Gates, Integrated Circuits. **[Q-2]**

UNIT 2: GATE - LEVEL MINIMIZATION

The Map Method, Four - Variable Map, Don't - Care Conditions, SOP & POS Simplification, NAND and NOR Implementations, Exclusive - OR Function. **[Q-2]**

UNIT 3: COMBINATIONAL LOGIC

Combinational Circuits, Design Procedure, Binary Adder - Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers, Demuliplexers **[Q-2]**

UNIT 4: SYNCHRONOUS SEQUENTIAL LOGIC

Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure. **[Q-1]**

UNIT 5: REGISTERS AND CIRCUITS

 Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other Counters. **[Q-1]**

TEXT BOOK:

M.Morris Mano- Digital Design, 3rd Edn, Pearson Education, New Delhi - 2005.

REFERENCE BOOK:

A.B.Marcovitz- Introduction to Logic Design, TMH, New Delhi - 2002.

C++ PROGRAMMING LAB (BCA P2006)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of C++ Programming lab will be from the theory classes of BCA C2004

DATABASE MANAGEMENT SYSTEM LAB (BCA P2007)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Database Management System lab will be from the theory classes of BCA C2003

CIRCUIT DESIGN LAB (BCA P2008)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Circuit Design lab will be from the theory classes of BCA C2005

DATA STRUCTURE USING C (BCA C3001)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION TO DATA STRUCTURE

Representation of single and multidimensional arrays; Sprase arrays. **[Q-2]**

UNIT 2: LISTS

Introduction to linked lists; Linked list types, operations on linked list. **[Q-2]**

UNIT 3: STACKS AND QUEUES

Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues. **[Q-2]**

UNIT 4: TREES

Introduction, Tree terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree. **[Q-1]**

UNIT 5: m –Way TREES

Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree, AVL tree. **[Q-1]**

UNIT 6: SORTING & SEARCHING TECHNIQUES

Sorting : Insertion sort, Selection sort, Merge sort, Bubble sort, Heap Sort

Searching Techniques: Linear search & Binary search

Text Book:
1. Seymour Lipschutz, Data Structure With C, Schaum's Outline Series, TMH, 2017

REFERENTIAL BOOKS:

1. E.Horowiz and S.Sahani, "Fundamentals of Data structures", Galgotia Book source Pvt. Ltd., 2003
2. R.S.Salaria, "Data Structures & Algorithms", Khanna Book Publishing Co. (P) Ltd.., 2002
3. Y.Langsam ET. Al., "Data Structures using C and C++", PHI, 1999

JAVA PROGRAMMING (BCA C3002)

TIME-3 hr **FULL MARKS-70** **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: JAVA EVOLUTION AND OVERVIEW OF JAVA LANGUAGE
How Java differs from C and C++, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Constants, Variables, Data Types, Scope of Variables, Symbolic Constants, Type Casting. **[Q-1]**

UNIT 2: OPERATORS AND Control Statements
Operators, Mathematical Functions, Decision Making, The switch Statement, The?: Operator, Loopoing Statements. **[Q-1]**

UNIT 3: CLASSES & OBJECTS
Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a. Class, Overriding Methods, final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control. **[Q-2]**

UNIT 4: ARRAYS, STRING AND VECTORS & INTERFACES
Arrays, Strings, Vectors, Wrapper Classes. Multiple Inheritances: Defining Interfaces, Extending Interfaces, implementing Interfaces, Accessing Interface Variables. **[Q-1]**

UNIT 5: PACKAGES & MULTITHREADED PROGRAMMING
Java API Packages, Using system Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Package, Adding a Class to a Package, Hiding Classes.
Threads, Extending the Thread Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority **[Q-2]**

UNIT 6: Exception Handling:
Types of Errors, Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using finally Statement, Throwing Our Own Exceptions, Using Exceptions. **[Q-1]**

TEXT BOOK:
1. E. Balagurusamy, Programming with Java, a Primer Second Edition, Tata McGrawHill, New Delhi.

REFERENCE BOOKS & WEBSITE:
1. H.M.Deitel & P.J.Deitel- JA V A- How to Program, 5th Edn, Pearson Education,NewDelhi-2004.
2. P.Naughton and H. Schildt-JAVA: The Complete Reference, TMH, New Delhi 2005.
3. www.spoken-tutorial.org, spoken tutorial IIT Bombay

COMPUTER ARCHITECTURE (BCA C3003)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1:
Basic computer organization and design, Instructions and instruction codes, instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro operations/ register transfer instructions, Bus/ Data transfer instructions, Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts. **[Q-2]**

UNIT 2: CENTRAL PROCESSING UNIT
Stacks organizations instruction formats, addressing modes, Data transfer and manipulation. Program control reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing. **[Q-2]**

UNIT 3: COMPUTER ARITHMETIC
Addition, subtraction . Floating point representation , arithmetic operations, decimal arithmetic operations. **[Q-1]**

UNIT 4: INPUT – OUTPUT ORGANIZATION
Peripheral devices, Input/output interface, ALU Asynchronous Data transfer, mode of transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor (IOP), serial communication. **[Q-1]**

UNIT 5: EVALUATION OF MICROPROCESSOR
Overview of Intel 8085 microprocessors, Architecture and Interface, internal architecture, external architecture memory and input/ output interface. **[Q-1]**

UNIT 5: ASSEMBLY LANGUAGE
Introduction to Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output programming. **[Q-1]**

TEXT BOOK:
1. M. Mano, Computer System Architecture, Prentice Hall of India, 2017.

REFERENTIAL BOOKS:

1. Leventhal, L.A, "Introduction to Microprocessors", Prentice Hall of India
2. Mathur, A.P., "Introduction to Microprocessors" , Tata McGraw Hill
3. Rao,P.V.S., "Prospective in Computer Architechture" , Prentice Hall of India

SYSTEM ANALYSIS AND DESIGN (BCA C3004)

TIME-3 hr   FULL MARKS-70   CREDIT-4

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: SYSTEM CONCEPTS:

Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system. System development Life Cycle: Various phases of system development, Considerations for system planning and control for system success, SDLC Models. **[Q-3]**

UNIT 2: INITIAL INVESTIGATION & FEASIBILITY STUDY:

Determining user's requirements and analysis, fact finding process and technique. Determination of Feasibility Study, Technical, Operational & Economic Feasibilities, Data Analysis, Cost and Benefit Analysis. **[Q-1]**

UNIT 3: TOOLS OF STRUCTURED ANALYSIS:

Data Flow Diagrams, Data Dictionary, Decision Trees, Decision Tables, Gantt charts, Structured English (Structured Query) and Pseudo code. **[Q-2]**

UNIT 4: User Manual, Programming manual, Operator manual, Software testing, Quality Assurance and Quality Control, Software maintenance and Software risk management, Threat and Risk Analysis. **[Q-2]**

TEXT BOOK:

1. V.K. Jain, System Analysis and Design, 2010, DreamTech Press.

REFERENCE BOOKS:

1. Perry Edwards, Systems Analysis & Design,2010, McGraw Hill.

PROBABILITY AND STATISTICS (BCA C3005)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: PROBABILITY

Introduction, Events & Different Types of Events, Addition & Multiplication Law, Conditional Probability, Bay's Theorem. **[Q-2]**

UNIT 2: PROBABILITY DISTRIBUTION

Random Variables, Probability Function, Binomial Poison & Normal Distribution. **[Q-1]**

UNIT3: STATISTICS & MEASURES OF CENTRAL TENDENCY

Definition, Function & Scope of Statistics. Arithmetic Mean, Weighted A.M., Median, Mode,

Geometric & Harmonic Mean and Their Merits & Demerits. **[Q-1]**

UNIT 4: MEASURES OF VARIATION: Range, The Interquartile Range or Quartile Deviation, Average(Mean), Deviation Standard Deviation, Coefficient of Variation, Skew ness, Moments &Kurtosis. **[Q-1]**

UNIT 5: CORRELATION ANALYSIS: Introduction, Karl Pearson's Coefficient of Correlation, Rank Correlation Coefficient. **[Q-1]**

UNIT 6: REGRESSION ANALYSIS: Difference Between Correlation & Regression, Regression Lines, Regression Equations, Regressions Coefficient. **[Q-1]**

UNIT 7: SAMPLING DISTRIBUTION:

Chi Square *(X2)* Distribution and Its Properties, Chi - Square Test, Application of Chi -Square Distribution: Chi-Square Test for Population Variance, Chi-Square Test of Goodness of Fit, Independence of Attributes, T- Distribution & Its Properties,Application of T - Distribution to Testing Hypothesis About Population Mean, Differencen Between Two Means, Correlation Coefficient, F- Distribution. **[Q-1]**

TEXT BOOKS:
1. S.P. Gupta & M.P. Gupta, "Business Statistics", Sultan Chand & Sons.
REFERENCE BOOKS:

1. S.C. Gupta & V.K. Kapoor ,"Fundamental of Mathematical Statistics", Sultan Chand & Sons.

DATA STRUCTURE LAB (BCA P3006)

TIME-3 hr **FULL MARKS-50** **CREDIT-1**

Experiment problems of Data and File Structure lab will be from the theory classes of BCA C3001

JAVA PROGRAMMING LAB (BCA P3007)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Data and File Structure lab will be from the theory classes of BCA C3002

STATISTICAL LAB (BCA P3008)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of statistical lab will be from the theory classes of BCA C3005

ANDROID PROGRAMMING   (BCA C4001)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT -1. INTRODUCTION:
History of Android, Introduction to Android Operating Systems, Android Development Tools, Android Architecture. **[Q-2]**

UNIT -2. DEVELOPMENT TOOLS
 Installing and using Eclipse with ADT plug-in, Installing Virtual machine for Android sandwich/Jelly bean (Emulator), configuring the installed tools, creating an android project   – Hello Word, run on emulator, Deploy it on USB-connected Android device. **[Q-2]**

UNIT -3. USER INTERFACE ARCHITECTURE:
Application context, intents, Activity life cycle, multiple screen sizes. **[Q-1]**

UNIT -4. USER INTERFACE DESIGN:
Form widgets, Text Fields, Layouts, Button control, toggle buttons, Spinners(Combo boxes),Images, Menu, Dialog. **[Q-2]**

UNIT -5. DATABASE
Understanding of SQLite database, connecting with the database. **[Q-1]**

Text Book
1. Android application development for java programmers. By James C. Sheusi. Publisher: Cengage Learning, 2013.
2. Android Programming with Kotlin for Beginners, John Horton

Reference Books

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
2. 2. Professional Android 4 Application Development, By Reto Meier WROX Publication
3. 3. The official site for Android developers - https://developer.android.com

OPERATING SYSTEM (BCA C4002)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION & COMPUTER-SYSTEM STRUCTURES
What is an Operating System? Function O.S., O.S structure, Types of O.S, I/O Structure, Storage Structure, Storage Hierarchy, System call. **[Q-2]**

UNIT 2: PROCESSES & CPU SCHEDULING:
Process Concept; Process Scheduling, Operations On Processes. Basic Concepts; Scheduling Criteria; Scheduling Algorithms. Deadlock: Methods for handling deadlock- Deadlock prevention, Avoidance & Detection. **[Q-2]**

UNIT 3: STORAGE MANAGEMENT
Memory Management-, Contiguous Memory Allocation, Paging, Demand Paging, Segmentation, Access Methods; Directory Structure; Protection. **[Q-2]**

UNIT 4: DISK MANAGEMENT:
Disk Structure; Disk Scheduling; Disk Management; Swap-Space Management. **[Q-1]**

UNIT 5: FILE MANAGEMENT:
File-System Structure; File-System Implementation; Directory Implementation; Allocation Methods, Free-Space Management. **[Q-1]**

TEXT BOOK:
1. A. Silberschatz et.al.-Operating System Concepts , 6th Edition, John Wiley Inc., 2003

REFERENCE BOOKS:
1. H.M. Deitel -Operating Systems , 6th Edition, Pearson Education, 2006
2. D.M. Dhandhare - Operating Systems, 2nd Edition, Tata McGraw Hill, New Delhi, 2006

HTML (BCA C4003)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: Introduction to HTML & Tags
Introduction to HTML, HTML documents structure tags, HTML text formatting tags, Inserting Special characters, Anchor tag, List tag, Adding images and sound. **[Q-2]**

UNIT 2: Advanced HTML
Tables, Frames and floating, developing forms. **[Q-1]**

UNIT 3: CSS (Cascading Style Sheet)
Introduction to CSS, Need of design in HTML pages, Tag structure, various selectors (ID, class), various properties of font and div tag. **[Q-1]**

UNIT 4: Data Access & Error Handing
Web Techniques, HTTP Basics, Server Information, Processing Forms, Setting Response Headers, Maintaining State, Databases, Using PHP to Access a Database, Security, SessionFixation, File Uploads, File Access, PHP Code, Handling Output, Error Handling. **[Q-2]**

UNIT 5: HTML Graphics and HTML Media
HTML Forms, HTML Form Elements, HTML Input Types, HTML Input Attributes, HTML Support, HTML New Elements, HTML Semantics, HTML Migration, HTML Style Guide . **[Q-2]**

TEXT BOOK:
1. Jackson, Web Technologies: A Computer Science Perspective, Pearson Education, 2007.

REFERENCE BOOK:
1. Kriss Jamsa, Konrad King, HTML & Web Design, TMH Publications, 2002.
2. Jason Hunter, William Crawford, Servlet Programming, O'REILY, 2010.

VISUAL PROGRAMMING (BCA C4004)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Introduction to NET:

The .NET Framework and the Common Language Runtime, Integrated Development Environment. **[Q-2]**

Unit 2:Programming in C#:

Data types in C#, Keywords, Operators, Conditionals and Loops. **[Q-1]**

Unit 3:.NET Assemblies. :

.NET Assemblies, Shared Assemblies, Side-By-Side execution of two versions of SharedObject, Benefits of Assemblies over Predecessors. **[Q-1]**

Unit 4: Windows Forms:

Working with Windows Forms, Working with Windows Form Controls, Buttons, Text Boxes, Labels, Checkboxes, Radio Buttons, Listbox, Combobox, Datetime Picker, Panels, Imagebox , Progressbar, Open File Dialog, Save File Dialog, Timer. **[Q-2]**

Unit 5: ADO.Net:

Introduction to Ado.Net, ADO.Net Data Providers, Working with Connection, Command, DataAdapter, Dataset & Datatable. Connecting a database with Windows Application using DataGridView control. **[Q-2]**

Text Book: 1. Steven Holizner, Visual Basic.NET Programming Black Book, 5TH Ed. (2007), Dreamtech Publication.

Reference Books:

1. Dinesh Maidasani, VB.net, Firewall Media Publication, 2007.

COMPUTER NETWORKS (BCA C4005)

TIME-3 hr　　　　　**FULL MARKS-70**　　　　　**CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: BASIC CONCEPTS AND TERMINOLOGY:
Introduction, OSI Model, Tcp/IP Model, Services and Standards. **[Q-2]**

UNIT 2: COMPUTER NETWORK:
Network Topology, Performance of Network, Network Classification, Advantages & Disadvantages of Network, Transmission Media (guided and unguided), Network Architecture.
[Q-2]

UNIT 3: DATA LINK LAYER:
Need for Data Link Control, Flow Control & Error Control: Flow control mechanism, Error Detection and Correction techniques. **[Q-1]**

UNIT 4: NETWORK LAYER: Routing, Congestion control, Internetworking principles, Internet Protocols:IPv4 packet format, Hierarchal addressing sub netting. **[Q-1]**

UNIT 5: TRANSPORT LAYER: Process to Process Delivery, TCP, UDP, TCP connection.
[Q-1]

UNIT 6: APPLICATION Layer:
Telnet, FTP, NFS, SMTP, SNMP and HTTP. **[Q-1]**

TEXT BOOK:
1. Prakash C. Gupta -Data Communications & Computer Networks, PHI, New Delhi.

REFERENCE BOOKS:
1. William Stallings- Data & Communications, 6th Edition, Pearson Education.
2. Tanenbaum- Computer Networks, 3rd Edition, PHI, New Delhi.

ANDROID PROGRAMMING LAB (BCA P4006)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Android Programming Lab will be from the theory classes of BCA C4001

VISUAL PROGRAMMING LAB (BCA P4007)

TIME-3 hr **FULL MARKS-50** **CREDIT-1**

Experiment problems of Visual Programming Lab will be from the theory classes of BCA C4004

HTML LAB (BCA P4008)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of HTML will be from the theory classes of BCA C4004

INTERNET CONCEPTS AND WEB DESIGN (BCA C5001)

TIME-3 hr　　　　　　**FULL MARKS-70**　　　　　**CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTERNET BASICS
Basic concepts, Communication on the Internet, Internet Domains, Internet Server Identities, Establishing Connectivity on the Internet, Client IP Address, A Brief Overview of TCP/IP and its Services, Transmission Control Protocol, Web Server , Web Client, Domain Registration. **[Q-2]**

UNIT 2: JAVA SCRIPT
Java Script in Web Pages, Advantages of Java Script, Advantages of Java Script, Data Types and Literals, Type Casting , Java Script Array, Operators and Expression, Conditional Checking , Function, User Defined Function. **[Q-2]**

UNIT 3: UNDERSTANDING XML
SGML, XML, XML and HTML, Modeling XML Data, DTD, Styling XML with XSL, XHTML. **[Q-2]**

UNIT 5: PHP
PHP installation and Introduction, Loops, String Functions in PHP, PHP Email Function, PHP Basics, Variables, Arrays in PHP with Attributes, Date & Time, Image Uploading. Session management, Database Handling **[Q-2]**

TEXT BOOKS:

1. Ivan Bay Ross- Web Enable Commercial Application Using HTML, DHTML, BPB Publication

REFERENCE BOOK & WEBSITE:
1. PHP The Complete Reference –Steven Holzner
2. Michel Morrison -HTML and XML for Beginners, PHI, New Delhi- 2001
3. H.M Dietal and P.J Dietal -Java How to Program, PHI, New Delhi- 2005
4. www.spoken-tutorial.org, spoken tutorial IIT Bombay

DESIGN AND ANALYSIS OF ALGORITHM (BCA C5002)

TIME-3 hr   FULL MARKS-70   CREDIT-5

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION & DESIGN OF EFFICIENT ALGORITHM
Algorithm, Complexity, Asymptotic Notations, Solving recurrences. **[Q-1]**

UNIT 2: DIVIDE AND CONQUER
Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort. **[Q-2]**

UNIT 3: THE GREEDY METHOD:
The General Method, Minimum Cost Spanning Trees: Kruskal & Prism's Algorithm. **[Q-2]**

UNIT 4: DATA STRUCTURE FOR SET MANIPULATION PROBLEMS
Fundamental Operations on Set, Hashing Technique, Binary Search Trees. **[Q-2]**

UNIT 5: ALGORITHM ON GRAPHS
Depth First Search, BFS, Depth First Search of a Directed Graph. **[Q-1]**

Text Book:
1. Horowitz E- Computer Algorithms, Galgotia Publication, New Delhi -2000

Reference Book:
1.   Aho A.V, Hopcroft J.E & Ullman J.D - The Design and Analysis of Computer Algorithm, Addison Wesley, 1998.

PYTHON PROGRAMMING (BCA C5003)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT I: INTRODUCTION
Identifiers , Keywords, Statements and Expressions, Variables, Operators, Arithmetic operators, Assignment operators, Comparison operators, Logical operators , Bitwise operators, Precedence and Associativity, Data types, Indentation, Comments, Reading Input, Print Output **[Q-2]**

UNIT II: CONTROL FLOW STATEMENTS
Control Flow Statements , If statement, If else statement, If elif else statement, nested if statement, while loop, for loop, continue and break statements, catching exceptions using try and except statement, Basic string operations, String comparison, Built in functions using strings, Accessing characters in string, String slicing, String joining , split() method, string traversing. **[Q-2]**

UNIT III: FUNCTIONS
Functions, Built in functions, function definition and calling, return statement, scope and lifetime of variables, command line arguments, Tuples, indexing, slicing, built-in functions used on tuples, traversing of tuples. **[Q-1]**

UNIT IV: LIST
Lists: Using List, List Assignment and Equivalence, List Bounds, Slicing, Lists and Functions, List Processing, Sorting, Flexible Sorting, Search, List Permutations, Randomly Permuting a List, Reversing a List. **[Q-1]**

UNIT V: OOPS
Objects: Using Objects- String Objects- List Objects. Custom Types: Geometric Points- Methods-Custom Type Examples- Class Inheritance. Handling Exceptions: Motivation- Exception Examples- Using Exceptions - Custom Exceptions. **[Q-1]**

UNIT VI: PACKAGES
Introduction to NUMPY, PANDA, MATPLOTLIB, SEABORN. **[Q-1]**

TEXT BOOKS:
Gowrishankar S, Veena A, "Introduction to Python programming", 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)
Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

REFERENCE BOOKS:
Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.
Jake VanderPlas,"Python Data Science Handbook:Essential Tools for working with Data",1st edition, O'Reilly Media, 2016.

COMPUTER ORIENTED NUMERICAL METHODS (BCA C5004)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: ERRORS IN NUMERICAL CALCULATIONS
Numbers and their accuracy, Errors and their Computations- Absolute, Relative and Percentage, General Error Formula. **[Q-2]**

UNIT 2: SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS
Introduction, Bisection method, Iteration method, Method of False Position, Newton- Raphson method.
[Q-1]

UNIT 3: INTERPOLATION
Introduction, Errors in Polynomial Interpolation, Finite Differences-Forward, Backward and Central, Detection of errors using Difference tables, Differences of a Polynomial, Newton's formulae for Interpolation, Central Difference Interpolation Formulae- Gauss's Central Difference Formula, Interpolation with unevenly spaced points, Lagrange's Interpolation Formula, Divided Differences and their properties- Newton's General Interpolation Formula. **[Q-2]**

UNIT 4: NUMERICAL DIFFERENTIATION AND INTEGRATION
Introduction, Numerical Differentiation and Errors, Numerical Integration – Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule. **[Q-2]**

UNIT 5: NUMERICAL SOLUTION OF LINEAR SYSTEM OF EQUATIONS
Direct Methods- Matrix Inversion Method, Gauss-Jordan Method, Gauss Elimination Method, Iterative Method- Gauss- Jacobi Method, Gauss-Seidel Method.
Taylor's Series, Euler's method, Modified Euler's method, Runge-Kutta method of 2nd and 4th order.
[Q-1]

TEXT BOOK:

1. S.S.Sastry -Introductory methods of Numerical Analysis,4th Edition,Prentice Hall of India, New Delhi, 2006

REFERENCE BOOKS:
1. V.N.Vedamurthy et.al.-Numerical Methods, Vikas Publishing House, New Delhi, 2005.
2. B.S.Grewal- Numerical Methods in Engineering & Science, Khanna Publishers,Delhi,2005.

INTERNET CONCEPT AND WEB DESIGN LAB (BCA P5005)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Visual Programming Lab will be from the theory classes of BCA C5001

NUMERICAL METHOD LAB (BCA P5006)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Linux programming lab will be from the theory classes of BCA C 5003

PYTHON PROGRAMMING LAB (BCA P5007)

TIME-3 hr **FULL MARKS-50** **CREDIT-1**

Experiment problems of Numerical Method Lab will be from the theory classes of BCA C5004

OPTIMIZATION TECHNIQUES (BCA C6001)

TIME-3 hr **FULL MARKS-70** **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: OPERATIONS RESEARCH-AN INTRODUCTION
Definitions of Operations Research, Characteristics of Operations Research Approach. **[Q-1]**

UNIT 2: LINEAR PROGRAMMING- APPLICATIONS AND MODEL FORMULATION
Graphical Solution Methods of LP Problem., Structure of Linear Programming Model, Advantages of Using Linear Programming, Limitations of Linear Programming, Applications Areas of Linear Programming, General Mathematical Model of Linear Programming Model, Guidelines on Linear Programming Model Formulation, Examples of LP Model Formulation.

[Q-2]

UNIT 3: LINEAR PROGRAMMING- THE SIMPLEX METHOD
Introduction, Standard Form of an LP Problem, Simplex Algorithm (Maximization Case), Simplex Algorithm (Minimization Case). **[Q-2]**

UNIT 4: TRANSPORTATION & ASSIGNMENT PROBLEM
Introduction, Mathematical Model of Transportation Problem, The Transportation Algorithm, Methods for Finding Initial Solution.
Introduction, Mathematical Model of Statement Assignment Problem, Solution Methods of Assignment Problem. **[Q-2]**

UNIT 5: PROJECT MANAGEMENT-PERT AND CPM
Introduction, Basic Differences between PERT and CPM, Phases of Project Management, PERT/CPM Network Components and Precedence Relationships, Critical Path Analysis. **[Q-1]**

TEXT BOOK:

1. J.K Sharma- Operations Research Theory & Applications, 3rd Edn, Macmillan India Ltd., New Delhi-2007.

REFERENCE BOOK:

1. H.A. Taha-Operations Research: An Introduction, Pearson Education, New Delhi, 2006.

PRINCIPLE OF MANAGEMENT (BCA C6002)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: NATURE OF MANAGEMENT
Meaning, Definition, it's nature purpose, importance & Functions, Management as Art andScience, Concepts of management-Administration-Organization, Management Skills, Levels of Management.
[Q-2]

UNIT 2: EVOLUTION OF MANAGEMENT THOUGHT
Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Peter Drucker to the management thought.
Business Ethics & Social Responsibility: Concept, Shift to Ethics, Tools of Ethics. **[Q-1]**

UNIT 3: FUNCTIONS OF MANAGEMENT: PART-I
Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning. Forecasting- Need & Techniques
Organizing – Elements of organizing & processes:
Types of organizations, Delegation of authority – Need, difficulties
Delegation – Decentralization
Staffing – Meaning & Importance
Direction – Nature – Principles
Communication – Types & Importance **[Q-3]**

UNIT 4: FUNCTIONS OF MANAGEMENT: PART-II
Motivation – Importance – theories
Leadership – Meaning –styles, qualities & function of leader
Controlling - Need, Nature, importance, Process & Techniques
Coordination – Need – Importance **[Q-2]**

TEXT BOOK:
1. Essential of Management – Horold Koontz and Iteinz Weibrich- McGrawhills International

REFERENTIAL BOOKS :
2. Management Theory & Practice – J.N.Chandan
3. Essential of Business Administration – K.Aswathapa, Himalaya Publishing House
4. Principles & practice of management – Dr. L.M.Parasad, Sultan Chand & Sons – New Delhi
5. Business Organization & Management – Dr. Y.K.Bhushan
6. Management: Concept and Strategies By J.S. Chandan, Vikas Publishing
7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
8. Business organization and Management by Talloo by Tata McGraw Hill

LINUX PROGRAMMING (BCA C6003)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-5**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: Overview Of Linux Architecture:
Kernel, Processes, Time Sharing, Shell, Files And Directories, Creation Of A File, Inode Numbers And Filenames, File Security, File Systems, Peripheral Devices As Files. **[Q-2]**

UNIT 2: Linux Editor and Basic LINUX Commands:
Ed Editor, Vi Editor, Redirections, Piping, Filters, LINUX Utilities, Grep, Sed, Awk etc.
[Q-2]

UNIT 3: Introduction to Shell Scripts:-
Bourne Shell C Shell, Shell Variables, Scripts, Metacharacters And Environments, If and case Statements. For, While and until Loops. **[Q-2]**

.
UNIT 4: Introduction To System Administration:-
File System ,System Administrator and its Role, Function of a system Manager, practical Aspect of System Administrator, Visual Attributes. System Call and C function Library:- linux System Call library function and Math Library, standard I/O package. File Hindling, Command Lie parameters, Linux –C interface, C files. **[Q-2]**

TEXT BOOK:
1. A. Robbins- Linux Programming by Example- Pearson Education, New Delhi- 2005

REFERENCE BOOKS:

2. J.Goerzen- Linux Programming Bible, IDG Books, New Delhi- 2001
3. N.Mathew & R.Stones- Beginning Linux Programming Wiley Publishing India, 2004

NETWORK SECURITY (BCA C6004)

TIME-3 hr   FULL MARKS-70   CREDIT-5

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: Introduction
 Attack, Services and Mechanism, Model for Internetwork Security. **[Q-1]**

Unit 2: Cryptography
Cryptography: Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption. **[Q-2]**

Unit 3: Digital signature and Authentication Application
 Overview, Digital Signatures and Authentication, Kerberos, X.509, Pretty Good Privacy **[Q-2]**
.
Unit 4: Web Security
 Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.
[Q-1]

Unit 5: System Security
 Intruders, Viruses and Relate Threats, Firewall Design Principles. **[Q-2]**

Referential Books:
1. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.
2. W.Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

PROJECT (BCA C6005)

One month industrial/in-house/organizational project

LINUX PROGRAMMING LAB (BCA P6006)

TIME-3 hr   **FULL MARKS-50**   **CREDIT-1**

Experiment problems of Linux programming lab will be from the theory classes of BCA C 6003

E-COMMERECE (BCA E5008)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION TO E-COMMERCE
E-commerce, E-commerce business models, Major business-to-consumer (B2C) business models, Major business-to-business (B2B) business models, Business models in emerging E- commerce areas, How the internet and the Web change business. **[Q-2]**

UNIT 2: E-COMMERCE INFRASTRUCTURE
The Internet, Technology background, The world wide web.
A systematic approach, choosing server software, choosing the hardware for an E-commerce site, other E-commerce site tools. **[Q-2]**

UNIT 3: SECURITY AND ENCRYPTION
The E-commerce security environment, Security threats in the E-commerce environment, Technology solutions, Policies, Procedures and Laws. **[Q-2]**

UNIT 4: E-COMMERCE PAYMENT SYSTEMS
Payment systems, Credit card E-commerce transactions, E-commerce digital payment systems in the B2C arena, B2B payment systems. **[Q-1]**

UNIT 5: ETHICAL, SOCIAL, AND POLITICAL ISSUES IN E-COMMERCE
Understanding ethical, social, and political issues in E-commerce, Privacy and information rights, Intellectual property rights, Governance, Public safety and welfare. **[Q-1]**

TEXT BOOK:

K.C. Laudon & C.G. Traver, E-commerce, Pearson Education, 2003

REFERENCE BOOKS:

1. R. Kalakota & A.B.Whiilston-' Frontiers of Electronic Commerce, Pearson
Education- 2006.
2. K.K.Bajaj & D.Nag- E-Commerce, Tata McGraw Hill, New Delhi, Second
Edition.

TIME-3 hr　　　　**FULL MARKS-70**　　　　**CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1:
Introduction: Purpose – productivity and quality in software – testing vs debugging – model for testing – bugs – types of bugs – testing and design style.

Unit 2:
Flow/ Graphs and path testing – achievable paths – path instrumentation – application – transaction flow testing techniques – data flow testing strategies

Unit 3:
Domain testing: Domains and paths – domain and interface testing – linguistic – metrics – structural metrics – path products and path expressions.

Unit 4:
Syntax testing – formats – test cases – logic based testing – decision tables – transition testing – states, state graph, state testing.

Unit 5 :
Verification and validation – fundamental tools – levels of testing – testing approaches – types of testing – test plan – software testing tools: WinRunner – Silk test.

Text Book:
1. B. Beizei, 2003, Software testing techniques, IIEdn., DreamTech India, New Delhi
2. K.V.K.K. Prasad, 2005, Software testing tools, DreamTech India, New Delhi

Reference Book:
1. I. Burnstein,2003, Practical software testing, Springer International Edn.
2. E. Kit, 1995, Software testing in the real world: Improving the process, Pearson Education, Delhi
3. R. Rajani, and P. P. Oak, 2004, Software testing Tata Mc. Graw Hill, New Delhi

MULTIMEDIA (BCA E50010)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT -1: AN OVERVIEW OF MULTIMEDIA
The Concept. Hardware for Multimedia Computer. Software for Multimedia. Components of Multimedia. Multimedia-Design, Production and Distribution. **[Q-2]**

UNIT -2: APPLICATIONS OF MULTIMEDIA:
Application Areas for Multimedia. Publishing Industry and Multimedia. Communication

Technology and Multimedia Services. Multimedia in Business. **[Q-1]**

UNIT-3: MULTIMEDIA PEDAGOGUES:
Interactive Systems for Teaching and Learning. Concepts for Distributed Learning Environment. A Medical Application: Med net - A Medical Collaboration and Consultation System. **[Q-2]**

UNIT -4: MULTIMEDIA AUTHORING TOOLS:
Multimedia Development Tools. Features of Authoring Software. Authoring Tools. Quick Time. Hypertext. Applications of Hypertext. Elements of Hypertext. **[Q-2]**

UNIT -5: MULTIMEDIA DEVELOPMENT:
Learning Interface Design. Planning the Multimedia Programme/Application. Development TIPS of Multimedia Building Blocks. Multimedia Authoring. **[Q-1]**

TEXT BOOK:
1. Tay Vaughan - 1999– Multimedia : Making it work – Fourth Edition – Tata McGraw – Hill Edition.

REFERENCE BOOKS:
1. Walterworth john A– 1991- Multimedia Technologies and Application - Ellis Horwood Ltd. – London.
2. John F koegel Buford – Multimedia Systems – Addison Wesley – First Indian Reprint.

<div align="center">

ELECTIVE - II

MANAGEMENT INFORMATION SYSTEM (BCA E6006)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

</div>

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

UNIT 1: INTRODUCTION TO MIS

The Technical and Business Perspective, Organization Structure, Evaluation of MIS through Information System, MIS Organization within the Company. **[Q-2]**

UNIT 2: INFORMATION SYSTEMS FOR DECISION MAKING

Evolution of an Information System, Basic Information Systems, Decision Making and MIS, Decision Assisting Information System, Concepts of Balanced MIS Effectiveness and Efficiency Criteria. **[Q-3]**

UNIT 3: DEVELOPMENT OF MIS

Methodology and Tools/Techniques for Systematic Identification, Evaluation and Modification of MIS. **[Q-1]**

UNIT 4: ADVANCED MIS

Concepts, Needs and Problems in Achieving Advanced MIS, DSS.   **[Q-1]**

UNIT 5: PITFALLS IN MIS DEVELOPMENT

Fundamental Weakness, Soft Spots in Planning and Design Problems.   **[Q-1]**

TEXT BOOK:

Murdic, Rose and Clagett- Information Systems for Modern Management, PHI, New Delhi.

REFERENCE BOOK:

Laudon-Laudon- Management Information Systems, Pearson Education, New Delhi.

ELECTIVE – II
ARTIFICIAL INTELLIGENCE (BCA E6007)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit1:
Basic Problem solving methods: Production system-state space search, control strategies, heuristic search, forward and backward reasoning, Hill climbing techniques. **[Q-2]**

Unit2:
Knowledge Representation: Predicate logic, Resolution, Semantic nets, Conceptual Dependency, frames and scripts. **[Q-1]**

Unit3:
Solving Problems By Searching, Problem Solving Agents, Searching For Solutions; Uniform Search Strategies: Breadth First Search, Depth First Search, Best-First Search, A* Search.
                                                                                    [Q-2]

Unit4:
AI languages: Important characteristics if AI languages- PROLOG, LISP. **[Q-1]**

Unit5:
Introduction to Expert Systems: Structure of an Expert System, Knowledge base, Design of an Expert system. **[Q-2]**

Text Book:

1. Ritch & Knight -Artificial Intelligence, TMH

Reference Books:

1. S. Russel and P. Norvig- Artificial Intelligence A Modern Approach, Pearson Education.

2. Patterson -Introduction to Artificial Intelligence & Expert Systems, PHI

ELECTIVE – II
SOFTWARE ENGINEERING (BCA E6008)

TIME-3 hr   **FULL MARKS-70**   **CREDIT-4**

The question paper shall consists of two sections: A and B. **Section A** will have eight (08) questions, out of which four (04) questions will be answered and will carry 10 marks each. **Section B** will consists of 10 short answer type questions which will cover the entire syllabus andwill carry 30 marks in all., each short-answer type questions carrying 3 marks.

Unit 1: INTRODUCTION
Introduction to Software Engineering: Characteristics, Emergence of Software Engineering, Software Metrics & Models, Process & Product Metrics. **[Q-2]**

Unit 2: SOFTWARE LIFE CYCLE
Software Life Cycle Models: Waterfall, Prototype and Spiral Models and their Comparison. **[Q-1]**

Unit 3: PROJECT MANAGEMENT
Software Project Management: Size Estimation- LOC and FP Metrics, Cost Estimation- Delphi and Basic COCOMO, Introduction to Halstead's Software Science, Staffing Level Estimation- Putnam's Model. **[Q-1]**

Unit 4: SOFTWARE DESIGN
Software Requirements Specification: SRS Documents, their Characteristics and Organization. Software Design: Classification, Software Design Approaches, Function Oriented Software Design, Structured Analysis- Data flow Diagrams and Structured Design, Introduction to Object Oriented Design. **[Q-2]**

Unit 5: SOFTWARE TESTING
Coding and Testing of Software: Unit Testing, Block Box Testing, White Box Testing, Debugging, Program Analysis Tools, System Testing. **[Q-1]**

Unit 6: SOFTWARE QUALITY ASSURANCE
Software Reliability and Quality Assurance: Reliability Metric- Musa's Basic Model. Software Quality Assurance: ISO 9000 and SEI CMM and their Comparison. **[Q-1]**

Text Book:
1.Rajib Mall -Fundamentals of Software Engineering, Prentice Hall of India, New Delhi,2005

Reference Book:
1. Pankaj Jalote- An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, New Delhi,2005
2. Richard Fairley- Software Engineering Concepts, Tata McGraw Hill, New Delhi, 200