STUDY AND EVALUATION SCHEME
BACHELOR OF COMPUTER APPLICATION
UNIVERSITY OF LUCKNOW, LUCKNOW
Total Credits = 132

YEAR: FIRST, SEMESTER –I

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-101	Essentials of Professional Communication	3	1	0	20	10	30	70	100	4
2	BCA-102	Principal of Management	3	0	0	20	10	30	70	100	3
3	BCA-103	Mathematics-I	3	1	0	20	10	30	70	100	4
4	BCA-104	Computer Fundamentals and Programming in C	3	1	0	20	10	30	70	100	4
5	BCA-105	Fundamentals of Environmental Sciences	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-106P	Computer Application Lab	0	0	3	10	10	20	30	50	2
7	BCA-107P	Programming in C Lab	0	0	2	10	10	20	30	50	1
8	BCA-108P	Professional Communication Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

YEAR: FIRST, SEMESTER –II

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-201	Mathematics-II	3	1	0	20	10	30	70	100	4
2	BCA-202	Advanced Professional Communication	3	0	0	20	10	30	70	100	3
3	BCA-203	Digital Electronics and Computer Organization	3	1	0	20	10	30	70	100	4
4	BCA-204	Data Structure using C	3	1	0	20	10	30	70	100	4
5	BCA-205	Accounting and Financial Management	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-206P	Advanced Professional Communication Lab	0	0	2	10	10	20	30	50	1
7	BCA-207P	Data Structure Lab	0	0	3	10	10	20	30	50	2
8	BCA-208P	Digital Electronics and Computer Organization Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

(A.A. Zilli)

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-301	Computer Based Numerical and Statistical Techniques	3	0	0	20	10	30	70	100	3
2	BCA-302	Object Oriented Programming using Java	3	1	0	20	10	30	70	100	4
3	BCA-303	Operating System	3	1	0	20	10	30	70	100	4
4	BCA-304	Management information System	3	0	0	20	10	30	70	100	3
5	BCA-305	Computer Architecture	3	1	0	20	10	30	70	100	4
PRACTICALS											
6	BCA-306P	Computer Based Numerical and Statistical Techniques Lab	0	0	2	10	10	20	30	50	1
7	BCA-307P	Object Oriented Programming & Java Lab	0	0	3	10	10	20	30	50	2
8	BCA-308P	Operating System Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-401	Discrete Mathematics	3	1	0	20	10	30	70	100	4
2	BCA-402	Business Economics	3	0	0	20	10	30	70	100	3
3	BCA-403	Computer Graphics and Multimedia systems	3	1	0	20	10	30	70	100	4
4	BCA-404	Data Base Management System	3	1	0	20	10	30	70	100	4
5	BCA-405	Software Engineering	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-406P	Graphics and Multimedia System Lab	0	0	3	10	10	20	30	50	2
7	BCA-407P	Data Base Management System Lab	0	0	2	10	10	20	30	50	1
8	BCA-408P	Software Engineering Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-501	Data Communication and Computer Network	3	1	0	20	10	30	70	100	4
2	BCA-502	Design and Analysis of Algorithm	3	1	0	20	10	30	70	100	4
3	BCA-503	Web design Concept	3	0	0	20	10	30	70	100	3
4	BCA-504	UNIX and Shell Programming	3	1	0	20	10	30	70	100	4
5	BCA-505	Elective-I	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-506P	UNIX Lab	0	0	2	10	10	20	30	50	1
7	BCA-507P	Web Design lab	0	0	3	10	10	20	30	50	2
8	BCA-508P	Data Communication and computer network Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Elective-I

1. Data Mining and Ware Housing
2. Software Testing Methodology *
3. Open Source Software
4. Information System: Analysis, Design & Implementation

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-601	E-Commerce	3	1	0	20	10	30	70	100	4
2	BCA-602	Cyber Law and Internet Security	3	1	0	20	10	30	70	100	4
3	BCA-603	Mobile Computing	3	0	0	20	10	30	70	100	3
4	BCA-604	Elective-II	3	1	0	20	10	30	70	100	4
PRACTICAL/PROJECT											
5	BCA-605P	Advanced Technology (Dot Net) Lab	0	0	3	10	10	20	30	50	2
6	BCA-Pro	Project	0	0	6	-	50	50	150	200	5
7	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	12	3	9					700	22

Elective-II

1. Optimization Techniques
2. Microprocessor
3. Data Compression
4. Cryptography*

BCA-101

ESSENTIAL OF PROFESSIONAL COMMUNICATION

L T P
3 1 0

Unit I (8)
Basics of Communication: Definition, Meaning, Process, Types, Forms, Levels, Flow, Importance and Features of Communication; Language as a tool of Communication; Barriers to Communication; 7 Cs of Communication

Unit II (12)
Basic Grammar: Parts of Speech; Articles; Pronouns; Verbs; Prepositions; Conjunctions; Tenses

Unit III (8)
Vocabulary and Paragraph Development: Word formation, Homophones, Homonyms, Synonyms, Antonyms; Sentence Formation: Subject and Predicate; Paragraph Development: Techniques and Methods of Paragraph Development, Précis Writing, Note Taking, Summary

Unit IV (12)
Written Communication: Writing Process and Strategies; Letter Writing: Application writing, Sales Letter; Purchase Letter, Claim Letter, Adjustment Letter; Proposal Writing: Importance and Methods, Elements of Proposal; Report Writing: Importance, Process, Building Questionnaire, Elements, Memo, Notice, Basic E-mail Etiquettes

Text and Reference Books:
1. Developing Communication Skills by Krishna Mohan and MeeraBennerji, Macmillan India Ltd.
2. A Manual of Practical Communication by L U B Pandey and R P Singh, AITBS Publications India Ltd.
3. Professional Communication by Meenakshi Raman and Sangeeta Sharma, OUP
4. Functional Skills in Language and Literature by R P Singh, OUP
5. How to Write Correct English by R P Sinha, Bharti BhawanPrakashan

1

PRINCIPLE OF MANAGEMENT

L T P
3 0 0

(8)

Unit I
Nature of Management: Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management- Administration-Organization, Management Skills, Levels of Management. Evolution of Management Thought. Business Ethics & Social Responsibility.

(10)

Unit II
Planning: Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels – advantages & limitations. Forecasting- Need & Techniques Decision making-Types - Process of rational decision making & techniques of decision making Organizing – Elements of organizing & processes: Types of organizations.
Staffing: Fundamentals of staffing, Recruitment and selection, Training and development.

(10)

Unit III
Fundamentals of Organizational Behavior: Nature, Scope, Definition and Goals of Organizational Behavior; Fundamental Concepts of Organizational Behavior; Models of Organizational Behavior; Emerging aspects of Organizational Behavior: Meaning Cultural Diversity, Managing the Perception Process. Perception, Attitude, Values and Motivation Concept, Nature, Process, Importance, Management Behavioral aspect of Perception. Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive;

(12)

Unit IV
Motivation: Importance – theories Leadership – Meaning – styles, qualities & function of leader Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need – Importance. Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management. Strategic Management Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits.

Text and Reference Books:
1. Essential Of Management – Horold Koontz And Iteinz Weibrich- Mcgrawhills International
2. Management Theory & Practice – J.N.Chandan
3. Organizational Behavior Text, Cases And Games- By K.Aswathappa, Himalaya Publishing
4. House, Mumbai, Sixth Edition (2005)
5. Organizational Behavior – Anjali Ghanekar

BCA-103

MATHEMATICS-I

L T P
3 1 0

Unit I   (12)
Matrix Algebra: Types of Matrices, Inverse of a matrix by elementary transformations, Rank of a matrix (Echelon & Normal form). Linear dependence. Consistency of linear system of equations and their solution, Characteristic equation. Eigen values and Eigen vectors, Cayley-Hamilton Theorem (without proof), Complex and Unitary Matrices and its properties.

Unit II   (10)
Differential Calculus–I: Successive Differentiation, Leibnitz's theorem, Limit, Continuity and Differentiability of functions of several variables. Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables, Curve tracing in cartesian coordinates.

Unit III   (10)
Differential Calculus–II: Taylor's and Maclaurin's Theorem, Expansion of function of several variables, Jacobian, Approximation of errors. Extrema of functions of several variables, Lagrange's method of multipliers (Simple applications), Beta and Gamma functions (simple problems).

Unit IV   (8)
Vector Calculus: Point function. Gradient, Divergence and Curl of a vector and their physical interpretations. Vector identities. Tangent and Normal, Directional derivatives. Line, Surface and Volume integrals. Applications of Green's, Stake's and Gauss divergence theorems (without proof).

Text and Reference Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. Thomas & Finley, Calculus, Narosa Publishing House
3. B. V. Ramana, Higher Engineering Mathematics, Tata Me Graw- Hill Publishing Company Ltd.
4. Shanti Narayan ,Differential Calculus , S. Chand & Co Publishers.
5. Shanti Narayan ,Integral Calculus , S. Chand & Co Publishers.
6. K. Hoffman and R. Kunze , Linear Algebra, Prentice-Hall.
7. B. Kolman & D.R. Hill- Linear Algebra With Applications, Pearson Education, SeventhEdition – 2003
8. S. Singh, Linear Algebra, Vikas Publication, New Delhi-2000.

COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

L T P
3 1 0

(10)

Unit I
Basics of Computer: Block Diagram of Computer; Characteristics of Computer, Classification of Computers, Generation of Computers, Input/ Output devices, Memory Hierarchy.
Operating system: Definition, purpose, function, services and types.
Number system: Binary, octal and hexadecimal number systems, their mutual conversions, Binary arithmetic.
Basics of Computer Programming Languages: Concept of algorithm and flow charts, Types of computer languages: Machine Language, Assembly Language and High Level Language, Concept of Assembler, Compiler, Interpreter, Loader and Linker.

(10)

Unit II
C Language Fundamentals: Character set, Keywords, Identifiers, Variables: Declaration and Initialization of variables, Scope of variables, Constant, Types of constant, Data type and sizes, Types of operators: Unary and Binary operators, Bit wise operators, Type conversion. Decision Control Statements: if, if-else, Nested if else, else if ladder, Switch statement, Break, Continue statement. Loops: for, while, do-while, Nesting of loops. Structure of C program, Compilation and Execution of C programs. Errors, Types of errors.

(10)

Unit III
Functions: Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Storage classes, Recursion.

(10)

Unit IV
Arrays: Array notation and representation, manipulating array elements, using multi-dimensional arrays. Structure, union, enumerated data types
Pointers: Introduction, declaration, standard C pre-processors, defining and calling macros.

Text and Reference Books:
1. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education .
2. Computer Concepts and Programming in C by Vikas Gupta, Wiley India Publication
3. Computer Fundamentals and Programming in C. Reema Thareja, Oxford Publication
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
5. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition , Cengage Learning - 2007.
6. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison-Wesley, 2006.

FUNDAMENTALS OF ENVIRONMENTAL SCIENCES

L T P
3 0 0

Unit I (10)

Fundamentals of Environmental Sciences: Definition, Scope, Importance of Environmental Sciences and Need of public awareness. Ecosystem- Definition, Energy flow in ecosystem, Ecological succession and Balanced ecosystem. Effect of Human Activities on environment of Agriculture, Housing, Industry, Mining and Transportation activities. Basics of Environmental Impact, Assessment and Sustainable development.

Unit II (10)

Natural Resources & Environmental Quality standard: Water resources- Availability and quality aspects of water. Mineral resources, Material Cycle- Carbon, Nitrogen & Sulphur cycles. Different types of energy-Conventional and nonconventional energy resources.

Unit III (10)

Environmental Pollution & Current Environmental issues: Environmental Pollution-Definition, Causes, Effects and control measure of:
1. Air Pollution
2. Water Pollution
3. Soil pollution
4. Marine Pollution

Importance of current environmental issues: Population growth, Climate change & Global warming and its causes, Urbanization, Acid rain. Ozone layer depletion- causes and effects on health, Control measures. Photochemical smog, Solid waste management, Waste water treatment.

Unit IV (10)

Environmental Quality standard & Legal aspects: Modern techniques used in analysis of Pollutants- Determination of disinfectants, Pesticides, Ambient Quality standards.
Role of Government, Legal aspects, Environment protection Act, Introduction to ISO 14000, Green building concept.

Text and Reference Books:
1. Environmental Studies- Dr. D. L. Manjunath, Pearson Education
2. Text book of Environment Studies- Erach Bharucha
3. Environmental Studies- Arun K Tripathi, Teri Publication. 2017.
4. Text book of Environmental studies-S. K. Dhameja, Rai Publication
5. Principle of Environmental Sciences – Jan J.Boersema - Spinger
6. Environmental studies- R. Rajagopalan- Oxford Publication-2005.

BCA-106P

COMPUTER APPLICATION LAB

Note: at least 2 practical needs to be conducted from each section.

1. **Introduction to MS Word**
   (a) Creating
   (b) Formatting
   (c) Tables
   (d) Drawings
   (e) Printing

Practical:

(i) Prepare a grocery list having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
   • Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   • The headings of the columns should be in 12-point and bold.
   • The rest of the document should be in 10-point Times New Roman.
   • Leave a gap of 12-points after the title.

(ii) Create a telephone directory.
   • The heading should be 16-point Arial Font in bold
   • The rest of the document should use 10-point font size
   • Other headings should use 10-point Courier New Font.
   • The footer should show the page number as well as the date last updated.

(iii) Create your resume

2. **Introduction to MS Excel**
   (a) Creating
   (b) Formatting
   (c) Tables
   (d) Charts
   (e) Printing

Practical:

(i) Enter the Following data in Excel Sheet

State	Qtr1	Qtr2	Qtr3	Qtr4	Qtr Total(Avg)	Rate	Amount
Rajasthan	2014	2541	2351	2014		12	
Delhi	2314	2589	6541	3215		14	
U.P.	1234	5216	4521	2365		15	
Harayana	8523	2654	1258	3269		16	
Punjab	9521	2547	3569	2546		17	

(a) Apply Formatting as follow:
- Title in TIMES NEW ROMAN
- Font Size - 14
- Remaining text - ARIAL, Font Size -10
- State names and Qtr. Heading Bold,
- Numbers in two decimal places.
- Qtr. Heading in center Alignment.
- Apply Border to whole data.

(b) Calculate
- Calculate Average for each quarter
- Calculate Amount = Rate * Qtr Total(Avg).

(ii) Given the following worksheet

Roll No.	Name	Marks	Grade
1001	Dhoni	84	
1002	Virat	58	
1003	Raina	66	
1004	Rahul	42	
1005	Sachin	99	

Calculate the grade of these students on the basis of following guidelines:
If Marks Then Grade
$\geq$ 80 A+
$\geq$ 60 < 80 A
$\geq$ 50 < 60 B
< 50 F

(iii) Given the following worksheet

Salesman Id	Qtr1	Qtr2	Qtr3	Qtr4	Qtr Total	Commision
S001	5010	6012	6200	5200		
S002	7000	8000	9000	6325		
S003	4000	4500	3254	2145		
S004	6541	5241	6541	3265		
S005	5326	6200	8795	6900		

Calculate the commission earned by the salesmen on the basis of following Candidates:
If Total Sales Commission
< 20000 0% of sales
> 20000 and < 25000 4% of sales
> 25000 and < 30000 5.5% of sales
> 30000 and < 35000 8% of sales
$\geq$ 35000 11% of sales
The total sales is sum of sales of all the four quarters.

3. **Introduction to MS Power Point**

7

(a) Creating
(b) Formatting
(c) Graphics
(d) Effects
(e) Printing

Practical:
(i) Create a presentation on Memory Hierarchy of a digital computer system
(ii) Create a presentation on Functionalities of Operating System
(iii) Create a presentation on Input/ Output Devices of a digital computer system

4. **Introduction to MS Access**
(a) Database concepts
(b) Tables
(c) Forms
(d) Reports
(e) Printing

Practical:
(i) Create a Database
(ii) Create a table
(iii) Add data to table
(iv) Create a query

5. **Using essential accessories**
(a) Notepad
(b) MS-Paint
(c) Calculator

Practical:
(i) Create your resume in Notepad
(ii) Create a natural scenery in MS-Paint
(iii) Use system calculator to convert the degree Celsius value into Fahrenheit value

Books Recommended:
1. MS-Office 2000 (For Windows), Steve Sagman
2. MS-Office 2007, Michael Price
3. Comdex Windows 7 with Office 2010, Vikas Gupta

PROGRAMMING IN C LAB

L T P
0 0 2

1. Write C program to print a message on output screen.
2. Write C program to print sum of two integers given by the user.
3. Write C program to find largest of three integers.
4. Write C program to find factorial of an integer.
5. Write C program to check whether the given number is palindrome or not.
6. Write C program to find Sum of Digits of an integer.
7. Write C program to find product of digits of an integer.
8. Write C program to find whether the given integer is a prime number.
9. Write C program to find the reverse of a number.
10. Write C program to find whether the given integer is an Armstrong number.
11. Write C program to print sum of even and odd numbers from 1 to N numbers.
12. Write C program to print the Fibonacci series.
13. Write C program to find sum and average of n integers using linear array
14. Write C program to find factorial of n by recursion using user defined functions.
15. Write C program to interchange two values using Call by value and Call by reference.
16. Write C program to convert binary number into decimal number.
17. Write C program to convert decimal number into binary number.
18. Write C program that simply takes elements of the array from the user and finds the sum of these elements.
19. Write C program to perform addition, multiplication, transpose on matrices.
20. Write a C program for searching an integer in a linear array using Linear Search Technique
21. Write C program to display the mark sheet of a student using structure.

BCA-108P

PROFESSIONAL COMMUNICATION LAB

L T P
0 0 2

1. Self Introduction
2. Soft Skills—Grooming
3. Soft Skills—Behavioural
4. Speech Delivery – I
5. Speech Delivery – II
6. Debate
7. Group Discussion – I
8. Group Discussion – II
9. Role Play – I
10. Technology in Oral Communication—Public Address System

Books Recommended:
1. Spoken English—A Manual of Speech and Phonetics by R K Bansal and J B Harrison, Orient Blackswan
2. A Course in Phonetics and Spoken English by Sethi and Dhamija, PHI
3. English Pronouncing Dictionary by Daniel Joans, CUP

1. The marks distribution for General proficiency paper incorporated in each semester of BCA will be as follows:

S.N.	Assessment	Marks
1.	Discipline/ Behavior of Students Inside/Outside Institute Campus Verified by Head of the Department with visual documents for record.	20
2.	Participation of Students in Games/Sports/Cultural/Literary/ Hobby Events Verified by Head of the Department with visual documents for record.	20
3.	Academic Activities/ Special Lecture/ Industrial Visits by Students Verified by Head of the Department with visual documents for record.	10

2. Each BCA student shall appear in compulsory paper and clear this paper which is essential for the award of Undergraduate degree as decided by University of Lucknow.

11

STUDY AND EVALUATION SCHEME
BACHELOR OF COMPUTER APPLICATION
UNIVERSITY OF LUCKNOW, LUCKNOW

YEAR: FIRST, SEMESTER –II

| Sl. No. | Paper Code | Subject | Periods | | | Evaluation Scheme | | | | Sub Total | Credit |
| | | | | | | Sessional | | | Exam. | | |
			L	T	P	CT	TA	Total	ESE		
1	BCA-201	Mathematics-II	3	1	0	20	10	30	70	100	4
2	BCA-202	Advanced Professional Communication	3	0	0	20	10	30	70	100	3
3	BCA-203	Digital Electronics and Computer Organization	3	1	0	20	10	30	70	100	4
4	BCA-204	Data Structure using C	3	1	0	20	10	30	70	100	4
5	BCA-205	Accounting and Financial Management	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-206P	Advanced Professional Communication Lab	0	0	2	10	10	20	30	50	1
7	BCA-207P	Data Structure Lab	0	0	3	10	10	20	30	50	2
8	BCA-208P	Digital Electronics and Computer Organization Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Abbreviations:
CT: Class Test
TA: Teacher's Assessment
ESE: End Semester Examination

BC

MATHEMATICS

	L	T	P
	3	1	0

UNIT - I: MULTIPLE INTEGRALS   8
Double and triple integrals, Change of order of integration, Change of variables, Application of integration to lengths, Surface areas and Volumes- Cartesian and Polar coordinates.

UNIT -II: ORDINARY DIFFERENTIAL EQUATIONS   12
Definition and examples, Order and Degree of differential equations, Solutions of first order first degree differential equations, Variable Separable, Equations reducible to variable separable, Linear differential equations, Bernoulli's Differential equations, Linear differential equations of nth order with constant coefficients, Complementary function and particular integral.

UNIT - III: PARTIAL DIFFERENTIAL EQUATIONS   10
Origin of first order partial differential equations, Partial differential equations of the first order and degree one, Lagrange's solution, Partial differential equation of first order and degree greater than one. Charpit's method of solution. Solution of second order linear partial differential equations with constant coefficients.

UNIT - IV: STATISTICS & PROBABILITY   10
Moments, Moment generating functions, Skewness, Kurtosis, Correlation and Regression analysis, Binomial, Poisson and Normal distributions, Test of significance: Chi-square test, t-test.

Text Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3. J.N.Kapur, Mathematical Statistics, S. Chand & company Ltd., 2000.

Reference Books:
1. N.P.Bali and Dr. Manish Goyal, Engineering Mathematics University Science Press, Laxmi Publications, Pvt. Ltd.
2. V. Ramana, Higher Engineering Mathematics, Tata Me Graw- Hill Publishing Company Ltd.
3. M. D. Raisinghania, Advanced Differential Equations, S. Chand & Company Ltd.
4. M.Renardy and R.C.Rogers, An introduction to Partial Differential Equations, New York, Springer.
5. C.B.Gupta, Vijay Gupta, Introduction to Statistical Methods, Vikas Publishing.
6. Devore, Probability and Statistics, Thomson (Cengage) Learning, 2007.

BCA-202

ADVANCED PROFESSIONAL COMMUNICATION

L T P
3 0 0

Unit-I (10)
Communication for Employment: Difference between Resume, CV and Biodata, Types of Resume, Preparing a professional Resume, Offline job application, Online job application, Cover Letter for job application, Application on online job portals (Naukri.com, Angellist, Indeed.com etc), Use of social media for job application (LinkedIn, Facebook).

Unit-II (15)
Advanced Grammar: Phrase, Clause, Verb Phrase, Complex Sentences, Coordination, Focus, Phrasal Verbs.

Unit-III (10)
Business Etiquettes: Netiquettes; the art of Negotiation: Types, Characteristics, and Methods; Leadership: Leadership as a process, Leadership Attributes (Personality types and traits for Leadership, Intelligence and Emotional Intelligence in Leadership), Skills for building strong leadership (Credibility, Communication, Listening with understanding, Assertiveness, Effective stress management, Problem solving, Decision making and Improving Creativity); Personality assessment and Grooming; Presentation Strategies.

Unit-IV (05)
Improving Language through Literature:
1. "Of Studies" by Francis Bacon;
2. "Obituary" by Ramanujam;
3. "Australia" by A D Hope

Text Books:

1. Bakshi, R. N. (2000) A Course in English Grammar. Orient Longman, Hyderabad.
2. Mishra, Binod et al (2015, 6th reprint) Communication Skills for Engineers and Scientists. PHI, New Delhi.

Reference Books:
1. Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
2. Leadership by R. l. Hughes, R. C. Ginnett and G. J. Curphy (McGrow Hill, 8e)
3. Negotiation by Himanshu Rai (McGrow Hill)

BCA-203

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

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Unit-I   (08)
Basics of Digital Electronics: Character Codes (BCD, ASCII, EBCDIC) and its arithmetic, Signed binary numbers, Cyclic codes, error detecting code. Introduction to logic gates. **Gate-level minimization:** Boolean algebra: definition, axioms, basic theorems, and properties, Boolean functions, Canonical and standard forms, NAND and NOR implementation, K- map method up to five variable, don't care conditions.

Unit-II   (10)
Combinational Logic: Combinational circuits, analysis and design procedures, binary adder-subtractor, Introduction to decoders, encoders, multiplexers, De-multiplexers. **Sequential logic:** Sequential circuits, Latches, flip flops, analysis of clocked sequential circuits. Registers and Counters: Shift registers, Ripple counters. **Synchronous and Asynchronous Circuits:** Analysis of clocked sequential circuits, State reduction & assignments, Design procedure. Analysis procedure of Asynchronous sequential circuits, circuit with latches, design procedure.

Unit-III   (10)
Basics of Computer Organization: Functional units of digital computer and their interconnections, buses. Register, bus and memory transfer. Processor organization, general register organization, stack organization and addressing modes. **Arithmetic and logic unit:** Fixed and floating point representation, IEEE standard for floating point representation, Signed Adder, Subtracter circuits. Multiplication: Signed operand multiplication, Booth's algorithm. Division and logic operations. Arithmetic & logic unit design.

Unit-IV   (12)
Control Unit: Instruction types, formats, instruction cycles and sub-cycles, micro-operations, execution of a complete instruction. Introduction to microprogrammed control organization. **Memory:** Basic concept and hierarchy, semiconductor RAM memories. ROM memories. Cache memories: concept, design issues. **Input / Output:** Peripheral devices, I/O interface, I/O ports, Interrupts: Types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access.

Text Books:
1. Computer System Architecture, M. Mano (PHI)
2. Computer Organization, W. Stallings (PHI)

Reference Books:
1. Computer Organization, Vravice, Zaky & Hamacher (TMH Publication)
2. Structured Computer Organization, Tannenbaum (PHI)
3. Computer Organization, John P.Hayes (McGraw Hill)
4. Digital Logic and Computer Design, M. Morris Mano, (Pearson Education India)
5. Digital Circuit and Design, DP Kothari and JS Dhillon, (Pearson Education)
6. Computer Organization and Design, P Pal Chaudhary, (PHI)

BCA-204

DATA STRUCTURES USING C

L T P
3 1 0

Unit-I (10)

Introduction: Basic Terminology, Elementary Data Organization, Built in Data Types, Abstract Data Types. **Linked lists:** Representation and Implementation of Singly Linked List using Array, and Pointer, Doubly Linked List, Operations on a Linked List: Insertion, Deletion, And Traversal.

Unit-II (10)

Stacks: Array and Linked List Implementation of Stack, Basic operations: Push & Pop; Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression. **Recursion-** Principles and types of recursion; example of recursion: Fibonacci series, and Tower of Hanoi Problem. **Queues:** Array and linked list implementation of queues, Basic operations: Create, Add, Delete.

Unit-III (12)

Trees: Basic terminology, Binary Trees, Binary Tree Representation: Array and Linked List Representation, Strictly Binary Trees, Complete Binary Trees, Extended Binary Trees, Tree Traversal algorithms. **Binary Search Trees**: Insertion, Deletion and Searching. Concept & Basic Operations on AVL Tree. **Searching, Hashing and Sorting:** Binary Search, Concept of Hashing & Collision resolution Techniques, Insertion Sort, Selection Sort, Bubble Sort, Quick Sort.

Unit-IV (08)

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Minimum Cost Spanning Trees. Graph Traversal: Depth First Search and Breadth First Search, Minimum Cost Spanning Trees: Prims and Kruskal algorithm.

Text Books

1. Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI
2. R. Kruse et al, "Data Structures and Program Design in C", Pearson Education
3. Thareja, "Data Structure Using C" Oxford Higher Education.

Reference Books

1. Lipschutz, "Data Structures" Schaum's Outline Series, TMH
2. Jean Paul Trembley and Paul G. Sorenson, "An Introduction to Data Structures with applications", McGraw Hill
3. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication

BCA-205

ACCOUNTING AND FINANCIAL MANAGEMENT

L T P
3 0 0

Unit-I (10)
Overview: Meaning, objectives, Accounting Principles-concepts and conventions, Branches of Accounting, Accounting Cycle, Debit and Credit, Types of Account, Book-keeping, Source Document, Accounting Equation, Users of Accounting Information, Accounting Standards in India, Matching of Indian Accounting Standards with International Accounting Standards, Capital and Revenue items.

Unit-II (10)
Basics of Accounting: System of Accounting, Double Entry System, Introduction to Journal, Journalizing the transactions, Ledger and Posting, Trial Balance: Meaning, Methods and Error not disclosed by Trial Balance, Preparation of Final Accounts: Trading, Profit and Loss Account and Balance Sheet with simple adjustment entries.

Unit-III (10)
Financial Statement Analysis: Meaning, Objectives, Types and Methods. Ratio Analysis: Profitability Ratio, Activity Ratio, Liquidity Ratio and Solvency Ratio. **Fund Flow Statement:** Meaning, Objective, Concept of Gross and Net Working Capital. **Cash Flow Statement:** Meaning, Objectives, Various Cash and Non-Cash Transactions. Application of Computer in Accounting.

Unit-IV (10)
Introduction to Financial Management: Meaning, Nature, Approaches to Financial Management, Objectives: Profit Maximization and Wealth Maximization, Financial Decisions: Financing, Investment and Dividend Decisions, Liquidity Vs Profitability, Time Value of Money, Valuation Concept: Compounding and Discounting Principles, Sources of Finance: Short term and Long term.

Text Books:
1. Narayanswami- Financial Accounting: A Managerial Prespective, PHI
2. Tulsian- Financial Accounting, Pearson
3. Ravi M Kishore- Financial Management, Taxmann

Reference Books:
1. Mukherjee- Financial Accounting for Management, TMH
2. Khan and Jain- Financial Management, Tata McGraw Hill
3. Ghosh T P – Accounting and Finance for Managers, Taxmann
4. Ramchandran & Kakani-Financial Accounting for Management, TMH
5. Ashish K. Bhattacharya- Essentials of Financial Accounting, PHI
6. Chowdhary Anil - Fundamentals of Accounting and Financial Analysis, Pearson Education

BCA-206P

ADVANCED PROFESSIONAL COMMUNICATION LAB

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LIST OF PRACTICALS

1. Technical GD – I
2. Technical GD – II
3. Body Language at Workplace
4. Paper presentation techniques for Workshop and Seminars
5. Personality Test
6. Technical Presentation – I
7. Technical Presentation – II
8. Preparations for Personal Interview

Reference Books:

1. Pronouncing Dictionary by Daniel Jones
2. A Textbook of English Phonetics for Indian Students by T. Balasubramanian

BCA-207P

DATA STRUCTURE LAB

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Write Program in C for the following:

1. Arrays
    a. To implement addition of two 2D arrays.
    b. To implement multiplication of two 2D arrays.
2. To implement Singly Linked List
3. Stack
    a. To implement stack using array.
    b. To implement stack using linked list.
4. Queue
    a. To implement queue using array.
    b. To implement queue using linked list.
5. To implement binary tree using linked list.
6. To implement binary search tree using linked list.
7. To implement tree traversals using linked list.
8. Graph Traversal
    a. To implement BFS using linked list.
    b. To implement DFS using linked list.
9. To implement Binary Search.
10. To implement Bubble Sorting.
11. To implement Selection Sorting.
12. To implement Insertion Sorting.

BCA-208P

DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION LAB

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Note: Minimum ten experiments are to be performed from the following list.

1. Nomenclature of digital ICs, specifications, study of the data sheet, Concept of Vcc and ground, verification of the truth tables of logic gates using TTL ICs.
2. Realization of basic gates using Universal logic gates.
3. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
4. Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.
5. Decoder/Encoder
   a. Implementation and verification of Decoder using logic gates.
   b. Implementation and verification of Encoder using logic gates.
6. Implementing HALF ADDER, FULL ADDER using basic logic gates.
7. Multiplexer/ Demultiplexer
   a. Implementation of 4:1 multiplexer using logic gates.
   b. Implementation of 1:4 demultiplexer using logic gates.
8. Implementation of 4-bit parallel adder using 7483 IC.
9. Universal Shift Register
   a. Realization of Universal Shift Register using JK flip-flops & logic gates.
   b. Realization of Universal Shift Register using multiplexer & flip-flops.
10. Counters
    a. Design, and verify the 4-bit synchronous counter.
    b. Design, and verify the 4-bit asynchronous counter.
11. Design of an 8-bit ARITHMETIC LOGIC UNIT.
12. Design the data path of a computer from its register transfer language description.

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME
BACHELOR OF COMPUTER APPLICATION

SEMESTER –III

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-301	Computer Based Numerical and Statistical Techniques	3	0	0	20	10	30	70	100	3
2	BCA-302	Object Oriented Programming using Java	3	1	0	20	10	30	70	100	4
3	BCA-303	Operating System	3	1	0	20	10	30	70	100	4
4	BCA-304	Management information System	3	0	0	20	10	30	70	100	3
5	BCA-305	Computer Architecture	3	1	0	20	10	30	70	100	4
PRACTICALS											
6	BCA-306P	Computer Based Numerical and Statistical Techniques Lab	0	0	2	10	10	20	30	50	1
7	BCA-307P	Object Oriented Programming & Java Lab	0	0	3	10	10	20	30	50	2
8	BCA-308P	Operating System Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Abbreviations:
CT: Class Test
TA: Teacher's Assessment
ESE: End Semester Examination

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME
BACHELOR OF COMPUTER APPLICATION

SEMESTER –IV

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam. ESE		
			L	T	P	CT	TA	Total			
1	BCA-401	Discrete Mathematics	3	1	0	20	10	30	70	100	4
2	BCA-402	Business Economics	3	0	0	20	10	30	70	100	3
3	BCA-403	Computer Graphics and Multimedia systems	3	1	0	20	10	30	70	100	4
4	BCA-404	Data Base Management System	3	1	0	20	10	30	70	100	4
5	BCA-405	Software Engineering	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-406P	Graphics and Multimedia System Lab	0	0	2	10	10	20	30	50	1
7	BCA-407P	Data Base Management System Lab	0	0	3	10	10	20	30	50	2
8	BCA-408P	Software Engineering Lab	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Abbreviations:
CT: Class Test
TA: Teacher's Assessment
ESE: End Semester Examination

BCA-301

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

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Unit-I (08)
Error and Computer Arithmetic: Error and their analysis, Normalized Floating point arithmetic.
Algebraic and Transcendental equations: Bisection method, Iteration method, False position method, Newton-Raphson method, Rate of convergence methods, Solutions of simultaneous equations by Gauss Seidel method.

Unit-II (12)
Finite Differences: Difference operators, Difference tables, Relation between operators, Missing term techniques, Factorial polynomials.
Interpolation for Equal Intervals: Newton's forward and backward formula, Gauss forward and backward formula, Stirling's formula, Bessel's formula.
Interpolation for Unequal Intervals: Divided difference, Newton's divided difference formula, Lagrange's Interpolation formula.

Unit-III (10)
Numerical Differentiation and Integration: Numerical differentiation, Numerical integration by Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Boole's rule, Weddle's rule, Euler-Maclaurin's formula.
Solution of Differential Equations: Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta Method.

Unit-IV (10)
Curve Fitting: Method of least squares, Fitting of straight lines, Second degree parabola.
Time Series and Forecasting: Moving average, Forecasting models and methods.
Testing of Hypothesis: Test of significance, T-test, F-test, Chi-square test, Analysis of Variance.

Text Books:
1. Q.S. Ahmad, Zubair Khan and S.A. Khan, "Numerical and Statistical Techniques", Ane Books Pvt. Ltd., New Delhi.
2. S.S. Sastry, "Introductory Method of Numerical Analysis", PHI, New Delhi.

Reference Books:
1. P. Kandasamy, "Numerical Methods", S. Chand and Company, New Delhi.
2. Balaguruswamy, "Numerical Methods", T.M.H., New Delhi.
3. Qazi Shoeb Ahmad, M. V. Ismail and S.A.Khan, "Business Mathematics and Statistics", Laxmi Publication, Meerut.

BCA-302

OBJECT ORIENTED PROGRAMMING USING JAVA

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3 1 0

Unit-I **(10)**
Object-Oriented Analysis: Introduction to Object Oriented Concepts, Object Oriented Analysis Modeling, Data Modeling, Origin of Object-Oriented Design, Object Oriented Design Concepts, Object Oriented Design methods, Class and object definition, Refining operations, Program Components and Interfaces, Annotation for Object-Oriented Design, Implementation of Detail Design.

Unit-II **(10)**
Java Basic : JAVA environment, JAVA program structure, Tokens, Statements, JVM, Constant and Variables, Data Types, Declaration of variables, Scope of variables, Symbolic constants, Type Casting.
Operators: Arithmetic, Relational, Logical assignments, Increment and Decrement, Conditional, Bitwise, Special, Expressions and its evaluation.
Object and Class Concept: Defining a Class, Adding variables and Methods to classes, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, and Nesting of Methods.

Unit-III **(10)**
Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control.
Arrays: One Dimensional and Two Dimensional, Strings, Vectors, Wrapper Classes.
Interface: Defining Interface, Extending Interface, Implementing Interface, Accessing Interface Variable.

Unit-IV **(10)**
Exception Handling: Concepts of Exceptions, Types of Exception, Try and Catch keyword, Nested Try and Catch.
Threads: Creating Threads, Extending Threads Class, Stopping and Blocking a Thread, Life Cycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization.
Package: System Packages, Using System Package, Adding a Class to a Package, Hiding Classes.

Text Books:
1. E. Balagurusamy, "Programming in Java", TMH Publications.
Reference Books:
1. Peter Norton, "Peter Norton Guide to Java Programming", Techmedia Publications.
2. Naughton, Schildt, "The Complete Reference JAVA 2", TMH.

OPERATING SYSTEM

L T P
3 1 0

Unit-I (10)
Introduction: Definition and types, Structure, Components and Services, System Calls, System Programs.
Process Management: Process Concept, Process Scheduling, Cooperating Processes, Threads, Interprocess Communication, CPU Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling and Algorithm evaluation.

Unit-II (12)
Process Synchronization and Deadlocks: The Critical-Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Critical Regions, Monitors, Deadlock-System Model, Characterization, Deadlock Prevention, Avoidance and Detection, Recovery from Deadlock, Combined approach to Deadlock Handling.

Unit-III (10)
Memory Management: Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with Paging, Virtual Memory, Demand Paging and its performance, Page Replacement Algorithms, Allocation of Frames, Thrashing, Page Size and other considerations, Demand Segmentation.

Unit-IV (08)
File Management: File Systems, Secondary Storage Structure, File concept, Access methods, Directory implementation, Efficiency and performance, Recovery.
Disk Management: Disk Structure, Disk scheduling, Disk management, Recovery, Swap-Space Management, Disk Reliability.

Text Books
1. Abraham Siberschatz and Peter Galvin "Operating System Concepts", Wiley.
2. Tannenbaum, "Operating System", TMH.
Reference Books
1. Milan Milankovic, "Operating Systems, Concept and Design", McGraw Hill.
2. Harvey M Deital, "Operating System", Addison Wesley.

BCA-304

MANAGEMENT INFORMATION SYSTEM

L T P
3 0 0

Unit-I (12)
Foundation of Information System: Introduction to Information System in Business, Fundamentals of Information System, Solving Business Problems with Information System, Types of Information System, Effectiveness and Efficiency Criteria in Information System.
MIS Overview: Definition and Concept of a Management Information System, MIS versus Data Processing, MIS & Decision Support System, MIS & Information Resources Management, End User Computing, Structure of a Management Information system.

Unit-II (08)
Concepts of Planning and Control: Concept of Organizational Planning, The Planning Process, Computational Support for Planning, Characteristics of Control Process, The Nature of Control in an Organization.

Unit-III (10)
Business Applications of Information Technology: Internet and Electronic Commerce, Intranet, Extranet and Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

Unit-IV (10)
Managing Information Technology: Enterprise and Global Management, Security and Ethical Challenges, Planning and Implementing Changes.
Advanced Concepts in Information System: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

Text Books:
1. Brian, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.

Reference Books:
1. Brian, "Introduction to Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Murdick, "Information System for Modern Management", PHI Learning Private Limited, Delhi India.
3. Jawadekar, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.

BCA-305

COMPUTER ARCHITECTURE

L T P
3 1 0

Unit-I **(09)**
Introduction: Classification of computers and their instruction: general register organization, stack organization, addressing modes. Computer instruction types: formats, instruction cycles & sub-cycles, micro operations and execution of complete instruction. Introduction to RISC and CISC architecture.

Unit-II **(09)**
Basic Concepts of Parallel Processing: concept of programme, process, threads, concurrent and parallel execution. Classifications of Parallel architecture: Flynn's & Feng's Classification. Basic Pipelining Concepts: Performance metrics & measures and speed up performance laws.

Unit-III **(11)**
Pipeline Processing: principle of pipelining, general structure of pipelines, classification of pipeline processors, general pipeline and reservation tables. Principle of Designing pipelined Processor: pipeline instruction execution, pre-fetched buffer, internal forwarding and register tagging, hazard detection & resolution. Pipeline Scheduling Theory: scheduling problem, collision vector, state diagram, pipeline scheduling optimization, multiple vector task dispatching.

Unit-IV **(11)**
Programme Partitioning & Scheduling: grain size & latency, grain packing & scheduling and static multiprocessor scheduling. Programme Flow Mechanism: control flow vs data flow, demand driven mechanism and comparison of flow mechanism. SIMD Interconnection Network: static & dynamic network, mesh connected illiac network, cube interconnection network and omega network.

Text Books:
1. John P Hayes "Computer Architecture and organization" McGraw Hill
2. Dezso Sima,Terence Fountain and Peter Kacsuk " Advanced Computer Architecture" Pearson Education
3. Kai Hwang " Advanced Computer Architecture" TMH

Reference Books:
1. Linda Null, Julia Lobur- The Essentials of Computer Organization and Architecture, 2014, 4th Edition.
2. Rao, P.V.S. Prospective in Computer Architecture" Prentice Hall of India
3. William Stallings "Computer Organization and Architecture" Pearson
4. Carl Hamacher, ZvonkoVranesic and Safwat Zaky, "Computer Organization" Mcgraw Hill Fifth International Edition

BCA-306P

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES LAB

L T P
0 0 2

Note: - At least ten experiments are to be conducted.

1. WAP to find the eigen values and eigenvectors of a given square matrix.

2. WAP to find the root of the Algebraic equations using Bisection Method.

3. WAP to findthe root of the Algebraic equations using Regula - falsi Method.

4. WAP to find the root of the Algebraic equations using Newton Raphson Method.

5. WAP to implement Newton‟s Forward Interpolation formula.

6. WAP to implement Newton‟s Divided Difference Interpolation formula.

7. WAP to implement Langranges Interpolation formula.

8. WAP to implement Numerical Integration using Trapezoidal rule.

9. WAP to implement Numerical Integration using Simpson 1/3 rule.

10. WAP to implement Numerical Integration using Simpson 3/8 rule.

11. WAP to implement Numerical Differentiations.

BCA-307P

OBJECT ORIENTED PROGRAMMING & JAVA LAB

L T P
0 0 3

Note: - At least ten experiments are to be conducted. Perform practical using JAVA language.

1. Write a program in java which prints your name using command line arguments.

2. Write a program in java which enters three number using command line arguments and print sum and average of the number

3. Write a program to swap the value of 2 variables without using 3rd variable

4. Write a program to calculate the sum of digits of a given integer no.

5. Write a program to compute the sum of the first and last digit of a given number.

6. Write a program in java which enter the number using Data Input Stream and check whether the entered number is even or odd.

7. Write an application that reads a string and determines whether it is a palindrome.

8. Write a program to enter a sentence form keyboard and also find all the words in that sentence with starting character as vowel.

9. Write a Program in java which creates the array of size 5; find the sum and average of the five numbers.

10. Create a java program that has three version of add method which can add two, three, and four integers.

11. Program illustrating Classes and Objects.

12. Program illustrating Method Overloading and Method Overriding.

13. Program illustrating concept of Interface.

14. Program illustrating use of Final and Super keyword.

15. Program that illustrates the Creation of simple package.

16. Program that illustrates the Accessing of a package.

17. Program that illustrates the Handling of predefined exceptions.

18. Program that illustrates the Handling of user defined exceptions.

OPERATING SYSTEM LAB

L T P
0 0 2

Note: - At least ten experiments are to be conducted. Perform practical using C language.

1. FCFS(First Come First Served)

2. RR(Round Robin) Scheduling

3. SJF(Shortest Job First)

4. Priority Scheduling

5. FIFO(First In First Out) Page Replacement

6. LRU(Least Recent Used) Page Replacement

7. Optimal Page Replacement

8. Banker's Algorithm for Dead Lock Avoidance

9. Sequential File Allocation

10. Indexed File Allocation

11. Linked File Allocation

12. Paging Memory Allocation Technique

BCA-401

DISCRETE MATHEMATICS

L T P
3 1 0

Unit-I (12)
Set Theory: Introduction, Combination of sets, Multisets, Ordered pairs. Proofs of some general identities on sets.
Relation: Relations on sets, Types of relations in a set, Properties of relations, Composition of relations, Representation of relations, Closures of relations.
Function: Types of functions, Composition of functions, Recursively defined function.

Unit-II (08)
Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, Properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Auto-morphism of groups.

Unit-III (10)
Partial order sets: Definition, Partial order sets, Combination of partial order sets, Hasse diagram.
Lattices: Definition, Properties of lattices – Bounded, Complemented, Modular and Complete lattice.
Boolean Algebra: Introduction, Axioms and Theorems of Boolean algebra ,Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions, Karnaugh maps, Logic gates, Digital circuits and Boolean algebra.

Unit-IV (10)
Propositional Logic: Proposition, well formed formula, Truth tables, Tautology, Satisfiability, Contradiction ,Algebra of proposition, Theory of Inference. Predicate Logic: First order predicate, well formed formula of predicate, quantifiers, Inference theory of predicate logic.

Text Books:
1. Liptschutz, Seymour, "Discrete Mathematics", TMH.
2. Trembley, J.P and R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", TMH.

Reference Books:
1. C.L.Liu, "Elements of Discrete Mathematics", McGraw Hill.

BCA-402

BUSINESS   ECONOMICS

L T P
3 0 0

Unit-I **(08)**
Introduction: Meaning, Nature and Scope; Economic Problem: Scarcity & Choice; Application of Business Economics in Business Decisions; Objectives of Business Firms; Accounting Profit Vs Economics Profit; Optimization Rules: Revenue, Cost and Profit.

Unit-II **(10)**
Demand Analysis: Meaning, Basis of Demand, Types of Demand, Law of Demand, Elasticity's of Demand: Price Elasticity, Income Elasticity and Cross Elasticity; Consumer Equilibrium: Indifference Curve, Properties of Indifference Curve; Demand Forecasting Techniques.
Supply Analysis: Meaning, Law of Supply, Elasticity's of Supply.

Unit-III **(12)**
Production Analysis: Meaning, Production Function, Law of Production: Short run and Long run.
Cost Analysis: Concept of Cost, Theory of Cost: Short run and Long run; Economies and Diseconomies of Scale. **Pricing Strategy:** Process of Price Determination, Methods of Pricing, Pricing at different stages of PLC.

Unit-IV **(10)**
Market Structure Analysis: Meaning, Types of Market Structure, Price and Output Determination under Perfect Competition, Monopolistic Competition, Oligopoly and Monopoly Market.
Macro-Economics Concerns-National Income: Meaning, Measures of National Incomes, Methods of Measuring National Incomes (in brief); Business Cycle: Meaning and Phases of Business Cycle; Inflation: Meaning, Causes and Types; Monetary Policy: Meaning and Instrument of Monetary policy.

Text Books:
1. D.N. Dwivedi. "Managerial Economics", Vikas Publishing House
2. Ahuja H.L., "Business Economics",S.Chand & Co., New Delhi, 2001

Reference Books:
1. Ferfuson P.R., Rothchild, R and Fergusen G.J."Business Economics" Mac-millan, Hampshire, 1993
2. Karl E.Case & Ray C. fair , "Principles of Economics" , Pearson Education , Asia, 2000

BCA-403

COMPUTER GRAPHICS AND MULTIMEDIA SYSTEMS

L T P
3 1 0

Unit-I (08)
Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Hardware and software for Computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan: Converting Lines, Converting Circles, Converting Ellipses.

Unit-II (10)
Display Technologies: Raster-Scan Display System, Video Controller, Random-Scan Display Processor, Input Devices for Operator Interaction, Image Scanners, Working Exposure on Graphics Tools like Dream Weaver, 3D Effects.
Clipping: Sutherland- Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm.

Unit-III (12)
Geometrical Transformation: 2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Composition of 2D Transformations, Window-to-Viewport Transformations.
Representing Curves & Surfaces: Polygon Meshes Parametric, Cubic Curves, Quadric Surface, Solid Modeling: Representing Solids, Regularized Boolean Set, Operation Primitive Instancing, Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry, Comparison of Representations.

Unit-IV (10)
Introductory Concepts: Multimedia Definition, CD-ROM and the Multimedia Highway, Computer Animation Design, Types of Animation, Different Graphical Functions.
Multimedia: Uses of Multimedia, Making a Multimedia; The Stage of Project, Hardware and Software Requirements to make Good Multimedia, Skills and Training Opportunities in Multimedia, Motivation for Multimedia Usage.

Text Books:
1. Foley, Van Dam, Feiner, Hughes, "Computer Graphics Principles& Practice".
2. Tay Vaughan, "Multimedia, Making IT Work", Osborne McGraw Hill.
3. Buford, "Multimedia Systems", Addison Wesley.

Reference Books:
1. Sleinreitz, "Multimedia System", Addison Wesley.
2. David Hillman, "Multimedia technology and Applications", Galgotia Publications.
3. D.J. Gibbs & D.C. Tsichritzs, "Multimedia programming Object Environment& Frame work", LNCS Tutorial.
4. D. Haran & Baker, "Computer Graphics", Prentice Hall of India.

BCA-404

DATA BASE MANAGEMENT SYSTEM

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Unit-I (08)
Introduction to Databases: Advantage of Database System, Database System versus File System, View of Data, Database System Concepts and Architecture: Data Models, Schemas and Instances, Three schema architecture and Data Independence, Database Languages and Interfaces, Classification of Database Management Systems.

Unit-II (10)
Entity-Relationship Model: Basic Concepts, Constraints, Keys: Primary Key, Super key, Candidate key, Entity Types, Entity Sets, Design issues, Entity-Relationship Diagram, Relations, Relationship types, Roles and Structural Constraints, Weak Entity sets, Extended ER Features, Design of E-R Database Schema, Reduction of an E-R Schema to tables.

Unit-III (12)
Relational Model and Constraints: Relational model Concepts, Structure of Relational Databases, Constraints: Entity integrity, Referential Integrity, Domain Constraints, Assertions, Triggers, Security and Authorization, Authentication and Encryption.
SQL: Data Definition, Constraints, Schema Changes in SQL, Basic Queries in SQL, More Complex SQL Queries, Insert, Delete and Update Statements in SQL, Views (in SQL).

Unit-IV (10)
The Relational Algebra: Tuple Relational Calculus, Data Normalization: Functional dependencies, Normal form concepts upto 3rd Normal form.
Transaction Management and Recovery Techniques: Introduction to Transaction Processing, Transaction Concepts and Properties, Schedules, Serializability of Schedules, Conflict and view serializable schedules, Recovery Concepts, Recovery from Transactions, Introduction to Concurrency Control Techniques.

Text Books

1. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley.
2. Silberschatz, Korth, Sudarshan , "Database System Concepts", McGrawHill.

Reference Books

1. Date C J, "An Introduction to Database System", Addision Wesley
2. Leon & Leon, "Database Management System", Vikas Publishing House
3. Bipin C. Desai, "An Introduction to Database Systems", Galgotia Publications
4. Majumdar & Bhattacharya, "Database Management System", TMH
5. Ramkrishnan, Gehrke, "database Management System", McGraw Hill

BCA-405

SOFTWARE ENGINEERING

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3 0 0

Unit-I **(10)**
Software Product and SDLC: Software Engineering Fundamentals, Definition of Software Products, Phases of Software Development Life Cycle, Software Development Paradigm, Software Life Cycles Models: Build and Fix Model, Waterfall Model, Prototype Model, Iterative Model, Evolutionary Model, Spiral Model.

Unit-II **(10)**
Software Requirement Specification (SRS): Need for SRS-Requirement process, Problem Analysis using UML (Unified Modelling Language) and Data dictionary, Characteristics of SRS, Components of an SRS. IEEE standard for SRS.

Unit-III **(10)**
Software Design Principles: Software Design, Design Process, Design Principles: Abstraction, Refinement, Modularity, Information Hiding, Modular Design: Effective Modular Design and Functional Independence, Cohesion, Coupling, Top down and Bottom up Strategies, Coding: Coding Standard and Guidelines, Testing: Black Box Testing and White Box Testing.

Unit-IV **(10)**
CASE Tools: Relevance of CASE Tool**,** Building block for CASE Tools, Integrated Case Tool Environment, Generation of CASE Tool, High End and Low End CASE Tools.
Project Management Fundamentals: Definition of Project, Project Specification and Parameters, COCOMO model, Principles of Project Management, Project Management Life Cycle, Program Management Plan: Concept, Elements, Planning Issues, Benefits of Program Management.

   Text Books:
1. Rajib Mall, "Fundamental of Software Engineering", PHI.

   Reference Books:
1. R. Pressman, "Software Engineering", TMH.
2. Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa.
3. Pankaj Jalote, "Software Project Management in Practice", Person Education.

GRAPHICS AND MULTIMEDIA SYSTEM LAB

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Note: - At least ten experiments are to be conducted.

1. Write a program for 2D line drawing using DDA algorithm.

2. Write a program to draw a line using Bresenham's Algo.

3. Write a program for circle drawing as Raster Graphics Display.

4. Write a program to draw a circle using Midpoint algorithm.

5. Write a program to rotate a point about origin.

6. Write a program to rotate a triangle about origin.

7. Write a program to scale the triangle.

8. Write a program to translate the triangle.

9. Write a program to reflect the triangle.

10. Write a program for line clipping.

11. Write a program for polygon clipping.

12. Write a Program to implement 2D-transforrnation.

13. Introduction to Flash 5.0 creating a small animation using Flash 5.0.

DATA BASE MANAGEMENT SYSTEM LAB

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Part I: Getting familiar with SQL (Maximum number of turns allotted: 3)

1) Creating tables.

2) Insertion, Deletion, Updation and Retrieval of data.

3) Arithmetic operations, Logical operations and Pattern matching.

4) Concept of Grouping (Group by clause, Having Clause).

5) Use Aggregate function in query.

6) Write commands for Joins, Union and Intersection.

7) Concept of Sub-query.

8) Concept of Data constraints (Unique Key, Primary Key, Foreign Key).

9) Creating Views and Indexes.

Part II: Relational Database Implementation

Implement the following mini-project's database schemas and give an expression in SQL for each of the queries.

Project 1. Library Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

  LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price**)**

  IssuedBooks (Accession number, Borrower**)**

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.

b) Delete the record of book titled "Database System Concepts".

c) Change the Department of the book titled "Discrete Mathematics" to "CSE".

d) List all books that belong to "CSE" department.

e) List all books that belong to "CSE" department and are written by author "Navathe".

f) List all computer (Department="CSE") that have been issued.

g) List all books which have a price less than 500 or purchased between "01/01/2015" and "01/01/2019".

Project 2. Student Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

> **Student** (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number)
>
> Paper Details (Paper code, Name of the Paper)
>
> **Academic_details** (College roll number, Paper code, Attendance, Marks in home examination)
>
> **a)** Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
>
> **b)** Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75% attendance and more than 60% marks in paper 2.
>
> **c)** List all students who live in "Lucknow" and have marks greater than 60 in paper 1.
>
> **d)** Find the total attendance and total marks obtained by each student.
>
> **e)** List the name of student who has got the highest marks in paper 2.

Project 3. Customer Management System:

Create the following schema, enter at least 5 records in each table and answer the queries given below.

> **Customer** (CustID, email, Name, Phone, ReferrerID)
>
> **Bicycle** (BicycleID, DatePurchased, Color, CustID, ModelNo)
>
> **BicycleModel** (ModelNo, Manufacturer, Style)
>
> **Service** (StartDate, BicycleID, EndDate)
>
> **a)** Identify primary and foreign keys. Create the tables and insert at least 5 records in each table.
>
> **b)** List all the customers who have the bicycles manufactured by manufacturer "Honda".
>
> **c)** List the bicycles purchased by the customers who have been referred by customer "C1".
>
> **d)** List the manufacturer of red colored bicycles.
>
> **e)** List the models of the bicycles given for service.

Project 4. Human Resource Management System:

Create the following tables, enter at least 5 records in each table and answer the queries given below.

> **EMPLOYEE** (Person_Name, Street, City)
>
> **WORKS** (Person_Name, Company_Name, Salary)
>
> **COMPANY** (Company_Name, City)
>
> **MANAGES** (Person_Name, Manager_Name)

a) Identify primary and foreign keys.

b) Alter table employee, add a column "email" of type varchar(20).

c) Find the name of all managers who work for both Samba Bank and NCB Bank.

d) Find the names, street address and cities of residence and salary of all employees who work for "Samba Bank" and earn more than $10,000.

e) Find the names of all employees who live in the same city as the company for which they work.

f) Find the highest salary, lowest salary and average salary paid by each company.

g) Find the sum of salary and number of employees in each company.

h) Find the name of the company that pays highest salary.

Project 5. Supplier Management System:

Create the following tables, enter at least 5 records in each table and answer the queries given below.

     Suppliers (SNo, Sname, Status, SCity)

     Parts (PNo, Pname, Colour, Weight, City)

     Project (JNo, Jname, Jcity)

     Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.

b) Get supplier numbers for suppliers in Paris with status>20.

c) Get suppliers names for suppliers who do not supply part P2.

d) For each shipment get full shipment details, including total shipment weights.

e) Get all the shipments where the quantity is in the range 300 to 750 inclusive.

f) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.

g) Get the names of cities that store more than five red parts.

h) Get full details of parts supplied by a supplier in Delhi.

BCA-408P

SOFTWARE ENGINEERING LAB

Note: - At least 6 mini-projects are to be implemented from Part II.

Part I – To Familiarize with CASE tools using ATM system as specification. (Maximum number of turns allotted: 3)

1. Introduction and project definition
2. Software process overview
3. Project planning
4. Software requirements
5. Introduction to UML and use case diagrams
6. System modeling (DFD and ER)
7. Flow of events and activity diagram
8. OO analysis: discovering classes
9. Interaction diagrams: sequence and collaboration diagrams
10. Software Design: software architecture and object-oriented design
11. State Transition Diagram
12. Component and deployment diagrams
13. Software testing
14. Presentations.

Part II- Design a mini-project using CASE tools

Students are divided into batches of 5 each and each batch has to draw the following diagrams using UML for given different case studies for each batch. UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.

7. Component Diagram

8. Deployment Diagram.

Projects:

1. Patient Appointment and Prescription Management System

2. Organized Retail Shopping Management Software

3. Online Hotel Reservation Service System

4. Examination and Result computation system

5. Automatic Internal Assessment System

6. Parking Allocation System

7. Wholesale Management System

8. Criminal Record Management : Implement a criminal record management system for jailers, police officers and CBI officers

9. DTC Route Information: Online information about the bus routes and their frequency and fares

10. Car Pooling: To maintain a web based intranet application that enables the corporate employees within an organization to avail the facility of carpooling effectively.

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

YEAR: THIRD, SEMESTER –V

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam.		
			L	T	P	CT	TA	Total	ESE		
1	BCA-501	Data Communication and Computer Network	3	1	0	20	10	30	70	100	4
2	BCA-502	Design and Analysis of Algorithm	3	1	0	20	10	30	70	100	4
3	BCA-503	Web design Concept	3	0	0	20	10	30	70	100	3
4	BCA-504	UNIX and Shell Programming	3	1	0	20	10	30	70	100	4
5	BCA-505X	Elective-I	3	0	0	20	10	30	70	100	3
PRACTICALS											
6	BCA-506P	UNIX Lab	0	0	2	10	10	20	30	50	1
7	BCA-507P	Web Design lab	0	0	3	10	10	20	30	50	2
8	BCA-508P	Viva-Voce on Summer Training	0	0	2	10	10	20	30	50	1
9	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	-
		Total	15	3	7					700	22

Elective-I

1. BCA-5051   Data Mining and Ware Housing
2. BCA-5052   Software Testing Methodology
3. BCA-5053   Open Source Software
4. BCA-5054   Information System: Analysis, Design & Implementation

UNIVERSITY OF LUCKNOW

STUDY AND EVALUATION SCHEME

BACHELOR OF COMPUTER APPLICATION

YEAR: THIRD, SEMESTER –VI

Sl. No.	Paper Code	Subject	Periods			Evaluation Scheme				Sub Total	Credit
						Sessional Exam			Exam.		
			L	T	P	CT	TA	Total	ESE		
1	BCA-601	E-Commerce	3	1	0	20	10	30	70	100	**4**
2	BCA-602	Cyber Law and Internet Security	3	1	0	20	10	30	70	100	**4**
3	BCA-603	Mobile Computing	3	0	0	20	10	30	70	100	**3**
4	BCA-604X	Elective-II	3	1	0	20	10	30	70	100	**4**
PRACTICAL/PROJECT											
5	BCA-605P	Advanced Technology (Dot Net) Lab	0	0	3	10	10	20	30	50	**2**
6	BCA-Pro	Project	0	0	6	-	50	50	150	200	**5**
7	BCA-GP	General Proficiency	-	-	-	-	-	-	-	50	**-**
		Total	**12**	**3**	**9**					**700**	**22**

Elective-II

1. BCA-6041   Optimization Techniques
2. BCA-6042   Microprocessor
3. BCA-6043   Data Compression
4. BCA-6044   Cryptography

BCA-501
Data Communication and Computer Network

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Unit-1   **08**
Introduction Concepts: Goals and applications of networks, network structure and architecture, the OSI reference model, services, network topology design, delay analysis, back bone design, local access network design, physical layer transmission media, switching methods, ISDN, and terminal handling.

Unit-2   **12**
Medium Access Sub Layer: Medium access sub layer - channel allocations, LAN protocols - aloha protocols - overview of IEEE standards - FDDI.
Data Link Layer: Elementary data link protocols, sliding window protocols, and error handling.

Unit-3   **12**
Network Layer: Point - to point Networks, routing, congestion control Internetworking -TCP /IP, IP packet, IP address, and IPv6.
Transport Layer: Transport layer - design issues, and connection management.

Unit-4   **08**
Session Layer: Design issues and remote procedure call.
Presentation Layer: Design issues.
Application Layer: File transfer, access and management, electronic mail, virtual terminals, other application. Example networks - internet and public networks.

Text Books:
1. Forouzen, "Data Communication and Networking", TMH.
2. A.S. Tanenbaum, "Computer Networks", Pearson Education.
3. W. Stallings, "Data and Computer Communication", Macmillan Press.

Reference Books:
1. Anuranjan Misra, "Computer Networks", Acme Learning
2. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", Mc Graw Hill Publisher.

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Unit-1   **08**
Introduction: Algorithms, analyzing algorithms, complexity of algorithms, growth of functions, performance measurements, sorting and order statistics - shell sort, quick sort, merge sort, heap sort, comparison of sorting algorithms, and sorting in linear time.

Unit-2   **12**
Advanced Data Structures: Red-Black trees, B – trees, Binomial Heaps, Fibonacci Heaps.
Divide and Conquer Sorting, Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Single source shortest paths - Dijkstra's and Bellman Ford algorithms.

Unit-3   **12**
Dynamic Programming: Knapsack, all pair shortest paths – Warshal's and Floyd's algorithms, resource allocation problem. Backtracking, branch and bound, graph coloring, n-queen problem, Hamiltonian cycles, and sum of subsets.

Unit-4   **08**
Selected Topics: Algebraic computation, fast Fourier transform, string matching, theory of NP-completeness, approximation algorithms, and randomized algorithms.

Text Books:
1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, "Introduction to Algorithms", Printice Hall of India.
2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", Galgotia Press.
3. Aho, Hopcraft, Ullman, "The Design and Analysis of Computer Algorithms" Pearson Education.

Reference Books:
1. Jon Kleinberg and Éva Tardos, "Algorithm Design", Pearson.
2. Michael T Goodrich and Roberto Tamassia, "Algorithm Design: Foundations, Analysis, and Internet Examples", Wiley.
3. Harry R. Lewis and Larry Denenberg, "Data Structures and Their Algorithms", Harper Collins.

BCA–503
Web Design Concept

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Unit-1   **12**
Introduction: Introduction and web development strategies, history of web and internet, protocols governing web, introduction to client-server computing, web applications, web project, and web team.

Unit-2   **08**
Web Page Designing: HTML: List, table, images, frames, forms, CSS, document type definition, object Models, presenting and using XML, **XML Processors**: DOM and SAX, and dynamic HTML.

Unit-3   **10**
Java script: Introduction, documents, forms, statements, functions, objects, introduction to AJAX, and VB script.

Unit-4   **10**
Server Site Programming: Introduction to active server pages (ASP), introduction to Java Server Page (JSP), JSP application design, JSP objects, conditional processing, declaring variables and methods, sharing data between JSP pages.

Text Books:
1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley.
2. Xavier, "Web Technology and Design", New Age International.
3. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.

Reference Books:
1. Ramesh Bangia, "Internet and Web Design", New Age International.
2. Deitel, "Java for programmers", Pearson Education.
3. Uttam k. Roy, "Web Technologies", Oxford.

BCA-504
UNIX and Shell Programming

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Unit-1   **08**
UNIX Architecture: The UNIX operating system, LINUX and gnu. The UNIX architecture, features of UNIX, POSIX and single UNIX specification, internal and external commands, command structure, man browsing and manual pages on-line.
The file system: The parent – child relationship, the home variable, pwd, cd, mkdir, absolute pathname, and relative pathname.

Unit-2   **10**
Basic File Attributes: Listing directory contents, the UNIX file system, ls –l, -d option, file ownership, file permissions, chmod, directory permissions, changing file ownership, file attributes.
The Process: Process basics, process status, system processes (-e or –a), mechanism of process creation, process states and zombies, and running jobs in background.

Unit-3   **10**
Simple Filters: pr, head, tail, cut, paste, sort, uniq, tr.
Filters using regular expressions – grep and sed: grep, Basic Regular Expressions (BRE), Extended Regular Expressions (ERE) and egrep, the stream editor, and line addressing using multiple instructions (-E and -F) context addressing.

Unit-4   **12**
The Shell: The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables, and essential shell programming.

Text Books:
1. Sumitabha Das, "UNIX – Concepts and Applications", Tata McGraw Hill.
2. Behrouz A. Forouzan, Richard F. Gilberg, "Unix and shell Programming", Thomson Learning.
3. Neil Matthew and Richard Stones, "Beginning Linux Programming", Wrox.

Reference Books:
1. Kernighan and Pike, "Unix programming environment", Pearson Education.
2. Rosen, Host, Klee, Farber, Rosinski, "The Complete Reference Unix", TMH.
3. Yashavant P. Kanetkar, "Unix Shell Programming", BPB Publications.

BCA-5051
Data Mining and Data Warehousing

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Unit-1   **08**
Introduction: Data mining-definition & functionalities, data processing, form of data pre-processing, data cleaning: missing values, noisy data, binning, clustering, regression, inconsistent data, data integration and transformation, and data reduction.

Unit-2   **12**
Concept Description: Association rule mining, mining single-dimensional Boolean association rules from transactional databases, Apriori Algorithm, **Classification and Predictions:** Decision tree, Bayesian Classification, and K-nearest neighbour classifiers.

Unit-3   **08**
Data Warehousing: Overview, definition, delivery process, difference between database system and data warehouse, multi-dimensional data model, data cubes, stars, snowflakes, fact constellations, concept hierarchy, process architecture, 3 tier architecture, and data marting.

Unit-4   **12**
OLAP: Aggregation, historical information, query facility, OLAP function and tools. OLAP servers, ROLAP, MOLAP, HOLAP, data mining interface, security, backup and recovery.

Text Books:
1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier.
3. Ian H. Witten, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann

Reference Books:
1. Sam Anahory, Dennis Murray, "Data Warehousing in the Real World: A Practical Guide for Building Decision Support Systems", Pearson Education.
2. Mallach, "Data Warehousing System", McGraw –Hill.
3. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining, & OLAP", Tata McGraw-Hill Education.

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BCA-5052
Software Testing Methodology

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Unit-1   **10**
Introduction: Principles of software testing, error, fault, failure, incident, error and fault taxonomies, test cases, limitations of testing, code inspections, desk checking, group walkthroughs and peer reviews and overview of graph theory for testers.

Unit-2   **10**
Functional Testing: Boundary value analysis, equivalence class testing, decision table-based testing, cause effect graphing technique.
Structural Testing: Path testing, DD-paths, cyclomatic complexity, graph metrics, data flow testing and slice-based testing.

Unit-3   **08**
Testing Activities: Unit testing, levels of testing, integration testing, system testing, debugging, regression testing and extreme testing.

Unit-4   **12**
Object Oriented Testing: Issues in object-oriented testing, class testing, GUI testing, object-oriented integration and system testing. Testing internet applications: overview and challenges and strategies of testing internet applications.

Text Books:
1. Paul Ammann and Jeff Offutt, "Introduction to Software Testing", Cambridge University Press, Cambridge, UK.
2. Mauro Pezze, Michal Young, "Software Testing and Analysis: Process, Principles and Techniques", Wiley India.
3. Yogesh Singh, "Software Testing", Cambridge University Press, New York.

Reference Books:
1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Van Nostrand Reinhold, New York.
3. Boris Beizer, "Software Testing Techniques", Van Nostrand Reinhold, New York.

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BCA-5053
Open Source Software

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Unit-1   08
Introduction- Introduction to open sources, need of open sources, advantages of open sources and application of open sources.

Unit-2   12
Open Source Operating Systems: LINUX- Introduction, general overview, kernel mode and user mode, process, advanced concepts, scheduling, personalities, cloning and signals.

Unit-3   08
Open Source Database: MySQL- Introduction - setting up account-starting, terminating and writing your own SQI programs, record selection technology, working with strings - date and time, sorting query results.

Unit-4   12
Open Source Programming Languages: PHP- Introduction - programming in web environment, variables, constants, datatypes, operators, statements, functions, arrays and OOP - string manipulation and regular expression.
Perl: Perl backgrounder, Perl overview, Perl parsing rules, variables and data -statements and control structures, subroutines, packages, and modules- working with files and data manipulation.

Text Books:
1. Martin C. Brown, "Perl: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint
2. Vikram Vaswani, "MYSQL: The Complete Reference", Tata McGraw -Hill Publishing Company Limited, Indian Reprint.
3. Paul Kavanagh, "Open Source Software: Implementation and Management", Elsevier.

Reference Books:
1. Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly.
2. Wesley J. Chun, "Core Phython Programming", Prentice Hall.
3. Steven Holzner, "PHP: The Complete Reference", Tata McGraw-Hill Publishing Company Limited, Indian Reprint.

BCA-5054
Information System: Analysis and Design & Implementation

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Unit-1   **12**
Basic Concept of Systems: The system: definition and concepts, elements of a system: input, output processor, control, feedback, environment, boundaries and interface, characteristics of a system, types of systems -physical and abstract system, open and closed systems, man-made systems, information and its categories.
Information systems: TPS, OAS, MIS, DSS, ESS; System analyst: role and need of system analyst and system analyst as an agent of change.

Unit-2   **08**
System Development Life Cycle: Introduction to SDLC. Various phases: study, analysis, design, development, testing, implementation, and maintenance.
System documentation: Types of documentation and their importance.

Unit-3   **10**
Tools for System Analysis: Data flow diagram (DFD), logical and physical DFDs, developing DFD, system flowcharts and structured charts, structured English, decision trees and decision tables.
System design module specifications: Module coupling and cohesion, top-down and bottom-up design, logical and physical design and structured design.

Unit-4   **10**
System Implementation and Maintenance: Need of system testing, types of system testing, quality assurance; system conversion, conversion methods, procedures and controls, system evaluation and performance.

Text Books:
1. Perry Edwards, "System Analysis & design", Mc Graw Hill Publication.
2. Jeffrey A. Hofer Joey F. George Joseph S. Valacich, "Modern System Analysis and Design", Addison Weseley.
3. Shouhong Wang, "Information Systems Analysis and Design", Universal-Publisher Boca Raton.

Reference Books:
1. Elias m. Awad, "System Analysis and Design", Galgotia Publications Pvt. Ltd.
2. Henry C. Lucas, "Analysis, Design and Implementation of Information Systems", McGraw-Hill Education.
3. Whitten, Bentaly and Barlow, "System Analysis and Design Methods", Galgotia Publication.

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1. Execute the following list of basic commands in UNIX:

   (i) pwd (ii) mkdir (iii) cd

2. Execute the following list of basic commands in UNIX:

   (i) who (ii) echo (iii) cat

   2. Execute the following list of basic commands in UNIX:

   (i) rm (ii) mv (iii) wc (iv) cp

4. Execute the basic file attributes with all possible options:

   (i) ls (ii) chmod

5. Execute basic commands using vi editor:

   a.   input mode commands

   b.   saving text and quitting

6. Execute basic commands using vi editor

   a.   navigation

   b.   editing text

   c.   searching pattern

7. Execute the following filters using regular expressions with all possible options:

   (i) grep (ii) sed

8. Write a shell script to display current date and calendar.

L T P
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1. HTML program to create resume preparation using tables.

2. HTML program for home page creation using frames.

3. HTML program for form creation.

4. Create a web page to embed an image map in a web page using HTML.

5. Create a web page to get the coordinates from an image using java script.

6. Create a web page with all types of cascading style sheets.

7. Write HTML/Java scripts to display your CV in navigator, your institute website,

    Department website and tutorial website for specific subject.

8. Design HTML form for keeping student record and validate it using Java script.

9. Writing program in XML for creation of DTD, which specifies set of rules.

10. Create a style sheet in CSS/ XSL & display the document in internet explorer.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

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BCA-601

E-Commerce

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Unit-1   **12**

Introduction: What is E-commerce, forces behind E-commerce industry framework, brief history of ecommerce, inter organizational E-commerce intra organizational E-commerce, and consumer to business electronic commerce, architectural framework.

Unit-2   **08**

Mobile Commerce: Introduction to mobile commerce, mobile computing application, wireless application protocols, WAP technology, mobile information devices, web security introduction to web security, firewalls & transaction security, client server network, emerging client server security threats, firewalls and network security.

Unit-3   **08**

Encryption: World wide web & security, encryption, transaction security, secret key encryption, public key encryption, virtual private network (VPN) and implementation management issues.

Unit-4   **12**

Electronic Payments: Overview of electronics payments, digital token-based electronics payment system, smart cards, credit card I debit card-based EPS, emerging financial instruments, and online banking**.**

Text Books:
1. Greenstein and Feinman, "E-Commerce", TMH.
2. Ravi Kalakota, Andrew Whinston, "Frontiers of Electronic Commerce", Addision Wesley.
3. Pete Lohsin , John Vacca "Electronic Commerce", New Age.

Reference Books:
1. Denieal Amor, "The E-Business Revolution", Addision Wesley.
2. Diwan, Sharma, "E-Commerce", Excel.
3. Bajaj & Nag, "E-Commerce: The Cutting Edge of Business", TMH.

BCA-602
Cyber Law and Internet Security

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Unit-1   **12**
Cyber Space Jurisdiction: Jurisdiction issues under IT Act, 2000, traditional principals of jurisdiction, extra-terrestrial jurisdiction and case laws on cyber space jurisdiction.
E–commerce and Laws in India: Digital / Electronic signature in Indian laws, E–commerce; issues and provisions in Indian law, and E –Governance.

Unit-2   **08**
Intellectual Property Rights, Domain Names and Trademark Dispute: Concept of trademarks in internet era, cybersquatting, reverse hijacking, jurisdiction in trademark disputes, copyright in the digital medium, and copyright in computer programs

Unit-3   **10**
Developing Secure Information Systems: Information security governance & risk management, security architecture & design security issues in hardware, data storage & downloadable devices, physical security of IT assets, access control, CCTV and intrusion detection systems and backup security measures.

Unit-4   **10**
Security Policies: Development of policies, WWW policies, email security policies, policy review process-corporate policies-sample security policies, publishing and notification requirement of the policies.

Text Books:
1. Prashant Mali, "Cyber Law & Cyber Crimes", Snow White publications, Mumbai.
2. Dr. Surya Prakash Tripathi, Ritendra Goyal and Praveen Kumar Shukla, "Introduction to Information Security and Cyber Law", Willey Dreamtech Press.
3. Sarika Gupta & Gaurav Gupta, "Information Security and Cyber Laws", Khanna Publishing House.

Reference Books:
1. Farooq Ahmad "Cyber Law in India", Pioneer Publications.
2. Vakul Sharma, "Information Technology Law and Practice", Universal Law Publishing Co. Pvt. Ltd.
3. Suresh T. Vishwanathan, "The Indian Cyber Law", Bharat Law House New Delhi.

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BCA-603
Mobile Computing

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Unit-1   **10**
Introduction: Issues in mobile computing, characteristics of mobile computing, structure of mobile computing and overview of wireless telephony: cellular concept.

Unit-2   **10**
Evaluation of Mobile System and Wireless Network: GSM, CDMA, FDMA, TDMA; **Wireless networking**: Wireless LAN overview, Bluetooth, wireless multiple access protocols, TCP over wireless, wireless applications, data broadcasting, mobile IP and WAP.

Unit-3   **08**
Data management issues: Management issues, hoarding techniques, data replication for mobile computers, adaptive clustering for mobile wireless networks and file system.

Unit-4   **12**
Mobile Agents and Routing algorithms: Mobile agent, security and fault tolerance, transaction processing in mobile computing environment, Mobile Adhoc Networks (MANETs), Routing protocols, Global State Routing (GSR), Destination Sequenced Distance Vector routing (DSDV) and Dynamic Source Routing (DSR) and Ad Hoc On-demand Distance Vector routing (AODV).

Text Books:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley.
2. Raj Kamal, "Mobile Computing", Oxford University Press.
3. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal, "Mobile Computing, Technology Applications and Service Creation", Mc Graw Hill.

Reference Books:

1. Charles Perkins, "Mobile IP", Addison Wesley.
2. Charles Perkins, "Ad hoc Networks", Addison Wesley.
3. Upadhyaya, "Mobile Computing", Springer.

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BCA-6041
Optimization Techniques

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Unit-1 10
Linear programming: Central problem of linear programming various definitions included statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical method formulation and linear programming problem.

Unit-2 10
Queuing Theory: Characteristics of queuing system, classification of queuing model single channel queuing theory and generalization of steady state m/m/1 queuing models (model-I, model-II).

Unit-3 08
Replacement Theory: Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.

Unit-4 12
Inventory Theory: Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite. **Job Sequencing:** Introduction, solution of sequencing problem, and Johnson's algorithm for n jobs through two machines.

Text Books:
1. S S Rao, "Enginering Optimization – Theory and Applications", New Age International (P) Ltd.
2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi," Operations Research", Pearson Education.
3. Gupta V.G., "Optimization Theory Techniques of Operations Research", Oxford Book Company.

Reference Books:
1. Abidi Mongi A. "Optimization Techniques in Computer vision", Springer.
2. Falk Heiko, "Source Code Optimization Techniques for Data Flow Dominated Embedded Software", Springer Verlag New York.
3. Evtushenko Yurij G. "Numerical Optimization Techniques", Springer Verlag New York.
4. Prakash   Om, "Information Theory and Optimization Techniques in Scientific Research", VDM Verlag.

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Unit-1   08
Microprocessors: Introduction, Advances in semiconductor technology, Organization of microprocessor-based system, and 8085 microprocessor.

Unit-2   10
The 8085 MPU architecture: 8085 bus organization, demultiplexing the bus AD7-AD0, generating control signals. ALU, timing and control unit, instruction register and decoder, register array, decoding and executing an instruction.

Unit-3   10
8085 Machine: Machine cycles and bus timings opcode fetch machine cycle, memory read machine cycle, memory k machine cycle, IO read machine cycle, IO write machine cycle and execution time of the instruction cycle.

Unit-4   12
Counters and time delays: Time delay using single register and register pair, Stack and subroutines, Call and return instructions, Advanced subroutine concept. Assembly language program Hexadecimal counter, Sum of odd and even numbers, Hex to BCD conversion and Interrupts.

Text Books:
1. Gaonkar, Ramesh S., "Microprocessor Architecture, Programming, and Applications with the 8085", Pen Ram International Publishing.
2. Ray, A.K. & Burchandi, "Advanced Microprocessors and Peripherals: Architecture Programming and Interfacing", Tata McGraw Hill.
3. B. Ram, "Fundamentals of microprocessor and microcontroller", Dhanpat Rai Publishing Co Pvt Ltd.

Reference Books:
1. Hall D.V, "Microprocessor and Interfacing", Tata McGraw Hill.
2. B.P. Singh & Renu Singh, "Microprocessors and Microcontrollers", New Age International.
3. Deniel Tabak, "Advance Microprocessor", TMH.
4. Triebel & Singh, "The 8088 and 8086 Microprocessors", Pearson Education.

BCA-6043
Data Compression

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Unit-1 10
Compression Techniques: Loss less compression, lossy compression, measures of performance, modeling and coding, mathematical preliminaries for lossless compression: A brief introduction to information theory, models: Physical models, probability models, Markov models, composite source model, uniquely decodable codes and prefix codes.

Unit-2 10
Huffman coding algorithm: Minimum variance Huffman codes, adaptive Huffman coding, update procedure, encoding procedure, decoding procedure, applications of Huffman coding: loss less image compression, text compression and audio compression.

Unit-3 12
Coding a sequence: Generating a binary code, Comparison of Binary and Huffman coding, Applications, Bi-level image compression-The JBIG standard, JBIG2, Image compression, Introduction of Dictionary Techniques, **Static Dictionary:** Diagram Coding, and Adaptive Dictionary.

Unit-4 08
Distortion criteria, Models, Scalar Quantization: The Quantization problem, uniform quantizer, adaptive quantization and non-uniform quantization.

Text Books:
1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers.
2. Peter D. Johnson Jr., Greg A. Harris, D.C. Hankerson, "Introduction to Information Theory and Data Compression", CRC.
3. David Salomon, "Data Compression: The Complete Reference 4th Edition", Springer.

Reference Books:
1. Drozdek, "Elements of Data Compression", Cengage Learning.
2. Timothy C., "Text Compression", Bell Prentice Hall.
3. Nitin Chikani, "The Complete Format of Data Compression & Decompression", Lambert.

BCA-6044
Cryptography

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Unit-1   **10**
Introduction to Security: Introduction to security: Attacks, services & mechanisms, security. Conventional encryption model, classical encryption techniques, steganography, modern techniques: simplified DES, block cipher principles, DES standard, DES strength, differential & linear cryptanalysis, block cipher design principles and block cipher modes of operation.

Unit-2   **08**
Conventional Encryption Algorithms: Conventional Encryption Algorithms: Triples DES, blowfish, International data encryption algorithm, RC5, placement of encryption function and key distribution.

Unit-3   **10**
Public Key Encryption: Public Key Encryption: public, key cryptography: principles of public, key cryptosystems, RSA algorithm, key management, Fermat's & Euler's theorem, primality test and the Chinese remainder theorem.

Unit-4   **12**
Message Authentication & Hash Functions: Message Authentication & Hash Functions: Authentication requirements, authentication functions, message authentication codes, hash function, md5 message digest algorithm, secure hash algorithm (SHA), and digital signatures.

Text Books:
1. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
2. Atul Kahate, "Cryptography and Network Security", TMH.
3. Douglas R. Stinson, "Cryptography: Theory and Practice", CRC press.

Reference Books:
1. William Stallings, "Network Security Essentials: Applications and Standards", Prentice Hall.
2. Johannes A. Buchmann, "Introduction to cryptography", Springer, Verlag.
3. Wenbo Mao, "Modern Cryptography: Theory and Practice", Prentice Hall PTR.
4. Simon Rubinstein Salzedo, "Cryptography", Springer.

BCA-605P
Advanced Technology (Dot Net) Lab

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1. Familiarization with IDE.

2. Programming Console applications using VB.NET covering all the aspects of VB.NET fundamentals

3. Object oriented programming using VB.NET covering objects, Inheritance, Polymorphism, Constructors, Static Classes, and Interfaces.

4. Programme to illustrate Exception Handling concepts.

5. Programme to illustrate use of Collections.

6. Programme to perform File I/O Operations.

7. Programming Windows applications using VB.NET covering all major controls and components, Menus, MDI, Event Handling.

8. Creating windows installer.

9. Programme to interact with Database from a Windows Desktop Application.

10. Programming to build web applications using web controls, maintaining state.

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.