GALGOTIAS UNIVERSITY

Syllabus of

Course Book BCA 2015-18

Name of School: School of Computing Science & Engineering

Department: Computer Application & Information Science

Year: 2015-18

Curriculum

Semester 1										
Sl. No	**Course Code**	**Name of the Course**					**Assessment Pattern**			
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**	**Total**
1	JAP101	Japanese Language-I	2	0	0	2	20	30	50	100
2	LLL112	Basic English	0	0	4	2	50	-	50	100
3	BCA110	Discrete Mathematics	3	0	0	4	20	30	50	100
4	BCA111	Digital Computer Fundamentals	3	0	0	3	20	30	50	100
5	BCA115	Introduction to Information Technology	3	0	0	3	20	30	50	100
6	BCA116	Programming in C	3	0	0	3	20	30	50	100
7	BCA147	Programming in C Lab	0	0	2	1	50		50	100
8	BCA148	Information Technology Lab	0	0	2	1	50		50	100
		Total	**14**	**0**	**8**	**19**				

Semester II										
Sl. No	**Course Code**	**Name of the Course**					**Assessment Pattern**			
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**	**Total**
1	EVS101	Environment Studies	3	0	0	3	20	30	50	100
2	LLL21	Professional Communication	2	0	2	2	50	-	50	100
3	BCA123	Data Structures	3	0	0	3	20	30	50	100
4	BCA124	Web Technology	3	0	0	3	20	30	50	100
5	BCA109	Principle Of Management	3	0	0	3	20	30	50	100
6	BCA121	Object Oriented Programming with C++	3	0	0	3	20	30	50	100
7	BCA141	Data Structures Lab	0	0	2	1	50		50	100
8	BCA144	Web Technology Lab	0	0	2	1	50		50	100
9	BCA142	Object Oriented Programming with C++ Lab	0	0	2	1	50		50	100
		Total	**17**	**0**	**8**	**20**				

Semester III										
Sl No	**Course Code**	**Name of the Course**					**Assessment Pattern**			
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**	**Total**
1	BCA216	Computer Architecture	3	0	0	3	20	30	50	100
2	BCA212	Database Management System	3	0	0	3	20	30	50	100
3	BCA213	JAVA Programming	3	0	0	3	20	30	50	100
4	BCA211	Introduction to Algorithm Analysis and Design	3	0	0	3	20	30	50	100
5	LLL223	Logical Skill Building	3	0	0	2	50		50	100
6	BCA215	Computer Based Numerical Techniques	3	0	0	3	20	30	50	100
7	BCA214	Principles of Accounting	3	0	0	3	20	30	50	100
8	BCA241	Introduction to Algorithm Analysis and Design Lab	0	0	2	1	50		50	100
9	BCA243	Java Programming Lab	0	0	2	1	50		50	100
10	BCA242	Database Management System LAB	0	0	2	1	50		50	100
		Total	**21**	**0**	**6**	**23**				

Semester IV										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Total
1	BCA221	Operating System	3	0	0	3	20	30	50	100
2	BCA224	Software Engineering	3	0	0	3	20	30	50	100
3	BCA225	.Net technology	3	0	0	3	20	30	50	100
4	BCA223	Computer Networking	3	0	0	3	20	30	50	100
5	BCA225	Graph Theory	3	0	0	3	20	30	50	100
6		PE-1	3	0	0	3	20	30	50	100
7	BCA251	Operating System Lab	0	0	4	2	50		50	100
8	BCA252	.Net technology Lab	0	0	2	1	50		50	100
9	BCA253	Computer Networking Lab	0	0	2	1	50		50	100
10		PE-1 Lab	0	0	2	1	50		50	100
11	BCA254	Software Engineering Lab	0	0	2	1	50		50	100
12	LLL322	Campus-to-Corporate	0	0	4	2	50		50	100
		Total	**18**	**0**	**14**	**23**				
Semester V										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA		ETE	Total
1	BCA311	Management Information System	3	0	0	3	20	30	50	100
2	BCA312	Computer Graphics	3	0	0	3	20	30	50	100
3	BCA344	Mobile Application Development	3	0	0	3	20	30	50	100
4	BCA316	Software Project Management	3	0	0	3	20	30	50	100
5		Program Elective-II	3	0	0	3	20	30	50	100
6	BCA342	Computer Graphics Lab	0	0	2	1	70		30	100
7		Elective II lab	0	0	2	1	70		30	100
8	BCA341	Project-I	0	0	8	4	50		50	100
9	BCA344	Mobile Application Development Lab								
		Total	**15**	**0**	**12**	**21**				
Semester VI										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Total
1	BCA360	Project Work-2	0	3	24	15	50		50	100
		Total	**0**	**3**	**24**	**15**				

List of
Electives

Sl No	Course Code	Name of the Electives					Assessment Pattern			
			L	**T**	**P**	**C**	**IA**	**MTE**	**ETE**	**Total**
		Elective-I(Any one)								
1	BCA228	Advance DBMS	3	0	0	3	20	30	50	100
2	BCA229	Advance DBMS Lab	0	0	2	1	50		50	100
3	BCA278	Python Programming language	3	0	0	3	20	30	50	100
4	BCA258	Python programming language Lab	0	0	2	1	50		50	100
7	BCA279	E-Commerce	3	0	0	3	20	30	50	100
		Elective -II (Any one)	**L**	**T**	**P**	**C**				
1	BCA363	Multimedia System	3	0	0	3	20	30	50	100
2	BCA343	Multimedia System Lab	0	0	2	1	70		30	100
3	BCA310	Network Security	3	0	0	3	20	30	50	100
4	BCA311	Network Security Lab	0	0	2	1	70		30	100
5	BCA367	Linux Administration	3	0	0	3	20	30	50	100
6	BCA347	Linux Administration Lab	0	0	2	1	70		30	100
7	BCA 362	Ad. Computer Network	3	0	0	3	20	30	50	100
8	BCA 361	Connecting Networks	3	0	0	3	20	30	50	100

Course Code: JAPA101	JAPANESE-I	L	T	P	C
Version No. 01	**Date of Approval:**	0	0	2	1
erequisite/Exposure					
Co-requisites					

Course Description

Knowledge of Japanese Language is essential and valuable in the field of all engineering streams like electrical, electronics, mechanical and civil. Knowledge of Japanese will help engineering students to widen their horizons and will open up new avenues for higher education in Japan. Foreign Language Teaching will also make the students multi-disciplinary and not focusing only on engineering psubjects. Thus, it is the stepping stone in the process of creating professionals with a global outlook and outreach. In a globalized world, understanding of other cultures constitutes an important component of soft skills. This can be enhanced by foreign language teaching. This will also promote an interdisciplinary approach in students.

Course Objectives

1. This course attempts to give the students a working knowledge of Japanese Language with emphasis on communicative competence.
2. This course will focus on listening and speaking.
3. Basic Japanese sentences will be introduced and practiced.
4. Sufficient vocabulary will be given to the students to converse in different situations using the language patterns taught.
5. Introduction to Japanese history, politics, culture and society will be given.
6. This course aims to give the students an interdisciplinary approach in order to compete in the globalized world.
7. This course will expose the students to a new culture which promotes respect for the 'others' and inculcates tolerance.

Course Pre-requisite : None

Course Outcomes

1. On the completion of the course, the students will be able to understand simple Japanese and answer question in Japanese.
2. They will be able to introduce themselves in Japanese and talk on simple topics such as 'My family', 'My city' etc.
3. They will have a basic understanding of Japanese society and culture.

Prescribed Texts

1. Shokyuu Nihongo, Japanese Language Center for International Students, Tokyo University of foreign Studies, Japan.
2. Nihongo Kana nyuu mon, Japan foundation, Japan.
3. Shin Nihongo no KISO-1, AOTS, 3A Corporation, Japan.

Additional References

1. Random House Japanese-English Dictionary
2. Japanese for Busy people, Video CD , AJALT, Japan.

COMMUNICATIVE JAPANESE-I (JAPL-1001)			L	T	P	C
			0	0	2	1
Session No	**Module**	**Topics**	**Core Reading**		**Additional Reference**	
1 – 4	**1**	Introduction to Japanese syllabary, Vowels and Consonants, Romaji, Hiragana, Katakana, Japanese Numerals, Demonstrative pronouns, Greetings, Set phrases – One gaishimasu – Sumimasen, wakarimashita Parts of body (look and learn)				
5-8	**2**	1.Hajimemashite. 2.Hon no Kimochi	LESSON 1 & 2			
9-12	**3**	3.kore wo kudasai. 4.Sochira wa nanjikara nanji made desu ka.	LESSON 3 & 4			
13- 16	**4**	5.Kooshi en e ikimasu ka. 6.Issho ni ikimasen ka.	LESSON 5 & 6			

Course Code: JAPA1001	**JAPANESE-I**	L	T	P	C
Version No. 01	**Date of Approval:**	0	0	2	1
erequisite/Exposure					
Co-requisites					

COURSE CONTENT

Unit I: Reading Writing Level 1 **8 lecture hours**

Listening: Identifying the key words
Reading and Writing: Textual Essay: Advertising
Letter Writing: Informal letters
Functional Grammar: Basics of grammar
Vocabulary: Identifying jumbled letters and framing sentences

Unit II: Reading Writing Level 2 **8 lecture hours**

Listening: Conversations

Reading and Writing: Textual Essay: Art of Listening
Letter Writing: Permission Letters
Functional Grammar: Tenses
Vocabulary: Commonly used phrasal verbs.

Unit III: Reading Writing Level 3 **8 lecture hours**

Listening: Listening to songs and answering multiple choice questions
Reading and Writing: Textual Essay: An Astrologer's Day
Letter Writing: To the editor
Functional Grammar: Active and Passive voice
Vocabulary: Prefix and Suffix

Unit IV: Laboratory **8 lecture hours**

English Master- Exercises 1-10, Cambridge Advanced Learners' Dictionary.**Text Books**

1. Compiled and prepared by English Division, SSH, VIT

Reference Books

1 Developing Communication Skills by Krishna Mohan & Meera Banerji
2 Communication Skill for you by Dharmendra Mittal

LLL112	BASIC ENGLISH	L T P C 2 0 2 3
Version No.		
Course Prerequisites:		
Objectives:		
1. To read and interpret a variety of written materials 2. to improve students vocabulary and enable them to use the words appropriately in different situations		
Expected Outcome:		
1. To use grammatical devices with care 2. To be able to perform simple and coherent writing		
Module I	Reading Writing Level 1	
Listening: Identifying the key words, **Reading and Writing:** Textual Essay: Advertising **Letter Writing:** Informal letters **Functional Grammar:** Basics of grammar **Vocabulary:** Identifying jumbled letters and framing sentences		
Module II	**Reading Writing Level 2**	
Listening: Conversations **Reading and Writing:** Textual Essay: Art of Listening **Letter Writing:** Permission Letters **Functional Grammar:** Tenses **Vocabulary:** Commonly used phrasal verbs		
Module III	**Reading Writing Level 3**	
Listening: Listening to songs and answering multiple choice questions **Reading and Writing:** Textual Essay: An Astrologer's Day **Letter Writing:** To the editor **Functional Grammar:** Active and Passive voice **Vocabulary:** Prefix and Suffix		
Module IV	**Laboratory**	
English Master- Exercises 1-10, Cambridge Advanced Learners' Dictionary		
Text Books 1. Compiled and prepared by English Division, SSH, VIT		
References 1. Developing Communication Skills by Krishna Mohan & Meera Banerji 2. Communication Skill for you by Dharmendra Mittal		
Mode of Evaluation	Assignments/Quizzes/Seminars/CAT/Term-end	

BCA110	DISCRETE MATHEMATICS	L T P C 3 1 0 4
Version No.		
Course Prerequisites:		

Objectives:

1. To teach the relevance of inference and algebraic theory to Computer Science Engineering problems.

Expected Outcome:

Students will have an understanding of the Discrete mathematics concepts and develop problem solving skills

Unit I	MATHEMATICAL LOGIC

Introduction – Propositions – Connectives – Truth tables – Tautologies and Contradictions – Equivalences implications – Normal forms – Methods of proof rules of inference for quantified propositions – Mathematical induction

Unit II	COMBINATORICS

Basics of counting – Combinations of permutations – Enumeration of combination and permutation – Pigeonhole principle – Inclusion – Exclusion principle – Ordered and unordered portions.

Unit III	RECURRENCE RELATIONS	

Generating function of sequences – Calculating coefficients of generating functions – Recurrence relations – Solving recurrence relations by substitutious and generating functions – Method of characteristic roots – Solution of homogenous recurrence relations

Unit IV	GRAPH THEORY:	

Basic concepts of graph theory – Diagraph – Paths – Reachability connectedness – Matrix representation of graphs – Subgraphs – Isomorphisms trees – Properties – Directed tress – Binary trees.

Unit V	BOOLEAN ALGEBRA:	

Post – Hasse diagrams – Lattices – Types of Lattices – Boolean Algebra – Basic theorems – Applications.

Text Books

J.L. Mott, A. Kandelad T.P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, PHI, 2nd Edition, 1999.

J.P. Trembley and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill – 13th reprint 2001.

BCA111:	DIGITAL COMPUTER FUNDAMENTALS	L T P C 3 0 0 3
Version No.	2	
Course Prerequisites:		

Objective:

1. To introduce students to the number system -conversion from one base to another, to solve equations using Karnaugh map and Tabulation method, design circuits for binary adder, code converter, multiplexer, arithmetic circuits and accumulator

Expected Outcome:

Students will develop an understanding of the number system and to design simple circuits

Module-I

Introduction – Converting Numbers from One Base to Another – Complements – Binary Codes – Integrated Circuits – Boolean Algebra – Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms.

Module II

Logic Gates – Karnaugh Map Up to 3 Variables – Don't Care Condition – Sum of Products and Products of Sum Simplification

Module III

Adder – Subtractor – Code Converter – Multilevel NAND and NOR Circuits – Binary Parallel Adder – Decimal Adder – Binary Multiplier-Binary Divider-Decoders – Encoder – Multiplexers-Demultiplexer.

Module IV

Flip Flops – Triggering of Flip Flops – Design of Counters –Ripple Counters

Module V

Registers – Shift Registers –Memory Devices – Introduction, Classification of Memories ,Basic Memory Structure ,RAM,ROM,PLA

Text Books

1. M. Morris Mano – Digital Logic and Computer Design, 3rd Ed, PHI – 1994.

References

1. A.P. Malvino and D.P. Leach – Digital Principles and Applications – Fourth Edition – Tata McGraw Hill Edition – 1999.

Revised Syllabus

BCA115	INTRODUCTION TO INFORMATION TECHNOLOGY	L T P C 3 0 0 3
Version No.	2	

Objective: 1 To provide information about the various computer tools available and to enable the students understand the role of information technology in various fields.

Expected Outcome:

1. Students will gain fundamental knowledge about database management systems, spreadsheets, word processing, Networking and Multimedia.

Unit I	INTRODUCTION	

IT an Introduction – Information Systems – Software and Data – IT in Business, Industry, Home, at Play, Education, Training, Entertainment, Arts, Science, Engineering and Maths – Computers in Hiding – Global Positioning System (GPS).

Unit II	TECHNOLOGY	

Types of Computers – Anatomy of a Computer – Foundations of Modern Information Technology – The Central Processing Unit – How Microprocessors and Memory Chips are Made – Memory – Buses for Input and Output – Communication With Peripherals.

Unit III	DEVICES	

I/O Devices – Inputting Text and Graphics – State of the Art – Input and Output – Pointing Devices – Foundations of Modern Output – Display Screens – Printers – Foundations of Modern Storage – Storage Media – Increasing Data Storage Capacity – Backing up your Data – The Smart Card.

Unit IV	INTERFACES	

Software – User Interfaces – Application Programs – Operating Systems – Document – Centric Computing – Major Software Issues – Network Computing – Word Processing and Desktop Publishing – Spreadsheet and Database Applications, Front Pages

Unit V	NETWORKS	

Network Applications – Foundation of Modem Networks – Local Area Networks – Wide Area Networks – Links Between Networks – Networks: Dial–up Access – High Bandwidth Personal Connections – Multimedia – Tools of Multimedia – Delivering Multimedia – Multimedia on Web.

Text Books

1. D.P. Curtin, K. Foley, K. Sen and C. Morin, Information Technology – The Breaking Wave, TMH Edition – 1999.

References

1. Sawyer, Williams and Hutchinson, Using Information Technology – Brief Version, McGraw Hill International Edition – 2003.

2. Fundamentals of Information Technology, Alexis Leon & Mathews Leon–Vikas Publishing House Pvt. Ltd. – 1999.

Revised Syllabus

BCA116	**PROGRAMMING IN C**	L T P C 3 0 2 4
Version No.	2	
Objective:		
To introduce the students to the concepts of C programming with emphasis on the following topics Functions, Arrays, Pointers, Structures, Files and Solve problems using the above concepts.		
Expected Outcome:		
Students will be able to solve problems of limited scope by writing programs using the concepts taught		
Module I	**INTRODUCTION**	
Introduction to programming language, Compilers, Interpreters, Types of Language, Other programming language, Identifiers - Keywords- Data Types - Access Modifiers - Data Type Conversions - Operators - Conditional Controls - Loop Controls- Input / Output Operations - Character Test Functions.		
Module II	**ARRAYS**	
Arrays - One Dimensional Arrays - Two Dimensional Arrays - Multi Dimensional Arrays - Handling of Character Strings - String - Handling Functions - Table of Strings - enum - Typedef.		
Module III	**FUNCTIONS**	
User Defined Functions - Need for User Defined Functions - Category of Functions - Nesting of Functions - Recursion - Functions with Arrays - Storage Classes - Macros and Preprocessors. Call by value, Call by Reference,		
Module IV	**Structures**	
Structures - Array of Structures - Arrays within Structures - Structures within Structures - Structures and Functions - Unions - Size of Structures.		
Module V	**Pointers**	
Pointers - Pointer Variables - Passing Pointers to Functions - Pointers and One Dimensional Array - Dynamic Memory Allocation - Pointers and Multi Dimensional Arrays - Arrays of Pointers - Pointers to Structures – Data files - Opening and Closing a Data file - Creating a Data file - Processing a Data file - Unformated Data file.		
Text Books		
B.S. Gottfried - Programming With C - Schaum's Outline Series - Tata McGraw Hill 2nd Edition - 2004..		
References		
1. E. Balagurusamy - Programming in ANSI C - Second Edition - Tata McGraw Hill- 1999.		

Name of The Course	Programming in C Lab	L	T	P	C
Course Code	BCA147	0	0	2	1
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Anti- requisite		70		30	100

List of Experiments:

1. Write a program to convert temperature from degree centigrade to Fahrenheit. °F = °C*9/5+32
2. Write a program to compute the addition, subtraction, product, quotient and remainder of two given numbers.
3. Write a program to swap the values of two variables.
4. Write a program to compute net amount from the given quAnti-ity purchased and rate per quAnti-ity. Discount of 10 .is allowed if quAnti-ity purchased exceeds 100.
5. Write a program to print the sum of digit of a given number.
6. Write a program to print the Fibonacci series up to a given number.
7. Write a program to print the prime numbers within a given number.
8. Write a program to check a given number is prime or not.
9. Write a program to check whether a no is an Armstrong number.
10. Write a program to determine and print the sum of the following harmonic series for a given value of n1 +1/2+1/3+1/4+……+1/n
11. Write a program to print the Floyds triangle

    1

    3

    5 6
12. Write a program to read three integer values from the keyboard and display the output stating that they are the sides of the right angled triangle.
13. Write a program to accept an year from the user and check whether the entered year is a leap year or not.
14. Write a program to print binary equivalent of an integer number.
15. Write a program to print the following pattern (take number of lines as input from the user).

    ***

    **

    *
16. Write a program to evaluate the following functions to

    Sin(x) = x - x3/3!+ x5/5!-…… & Cos(x) = x – x2/2!+ x4/4!-x6/6!+……
17. Write a program to _nd out the length of a given string without using the library function strlen().
18. Write a program to print the reverse of a given string.

19. Write a program to check if a given string is palindrome or not. A string is said to be palindrome if the reverse of the string is equal to the string.
20. Write a program to count the number of vowels in a given string.
21. Write a program for addition of two nxm matrices
22. Write a program for multiplication of two nxm matrics
23. Write a program to compute factorial of a given number using function.
24. Write a function for swapping of two numbers.
25. Write a program for finding factorial of a number using recursion.
26. Write a program to sort an array using Bubble Sort (using function).
27. Write a program to search a key number in an array using Sequential Search Method.(use function)
28. Write a program to accept student details (name,roll, address,phone no)and store them in a _le and perform the following operations on it.
    a. Search b. Add c. Delete d. Modify e. Display

Name of The Course	Information Technology Lab	L	T	P	C
Course Code	BCA148	0	0	2	1

S.No.	Title of Lab Experiments
1.	Write a procedure to create a resume.
2.	Write a procedure to create a cover page of a project report.
3.	Write a procedure to create a greeting card.
4	Write a procedure to create a company letterhead.
5	Write a procedure to create a simple newsletter.
6.	Write a procedure to create a mail merge letter.
7.	Write a procedure to create a macro and use it in an application.
8.	Write a procedure to create a presentation on basic DOS commands given below: a. a. Dir b. Md c. Cd d. Copy e. Del f. Copy
9	Write a procedure to create a presentation and add audio to it.
10.	Write a procedure to create a worksheet with 4 columns, enter 10 records and find the sum of all columns
11.	Write a procedure to create a report containing the pay details of the employee.
12.	Write a procedure to create a student result sheet.
13.	Write a procedure to create a simple bar chart to represent the sales of a company for 3 different periods
14.	Write a procedure to create a worksheet importing data from database and calculate sum of all the columns
15.	Write a procedure to create a simple table for result processing.
16.	Write a procedure to create a query table for the result processing table.
17.	Write a procedure to create a form to update/modify the result processing table.
18.	Write a procedure to create a report to print the result sheet and marks card for the result.

EVS 101	Environment Studies	L	T	P	C
Version No.	Date of Approval: Jun XX, 2013	3	0	0	3
Prerequisite					
co-requisites					

Course Objectives

The objective of this course is to:

1. Introduce the fundamentals and abstract concepts of environment studies.
2. Learn how concepts of social issues and the environment studies are useful in realistic problem solving.

Course Outcomes

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

1. Students will understand the need for eco-balance
2. Also, Knowledge on the method of pollution prevention

Catalog Description

The purpose of this course is to provide basic concepts of environment studies. To make the students understand and appreciate the unity of life in all its forms and the implications of life style on the environment.

Text Books

1. Kurian Joseph & R. Nagendran, "Essentials of Environmental Studies", 1st Edition , Pearson Education, 2004.

Reference Books

1. Keerthinarayana & Daniel Yesudian,"Environmental Science and Engineering",1st Edition, Hi-Tech publications, 2004.
2. Erach Bharucha, "A Text Book for Environmental Studies", Text Book of University Grants Commission, 2004.

3.Metcalf & Eddy,"Wastewater Engineering: Treatment and Reuse", New Delhi, TMH

Course Content

Unit I: Environment & Natural Resources — 8 hours

Definition, scope, importance, need for public, Natural Resources – forest resources – use, exploitation, deforestation, construction of multipurpose dams – effect on forests, Water resources – use of surface and subsurface water; effect of floods, drought, water conflicts, food resources – food problems, advantage and disadvantage of fertilizers & pesticides, effect on environment, Energy resources – need to develop renewable energy, land resources – Land degradation, land slides, soil erosion, desertification & case studies.

Unit II: Ecology & Bio-Diversity — 8 hours

Concept of ecosystem, structure & function of an ecosystem, producers, consumers and decomposers, energy flow, ecological succession, food chains, food webs and ecological pyramids. Bio diversity: Definition, genetic, species and ecosystem diversity, bio-geographical

classification of India, hotspots, threats related to habitat loss, poaching of wildlife, man-wildlife conflicts, Conservation of bio-diversity.

Unit III: Environmental Pollution **8 hours**

Definition – Causes, pollution effects and control measures of Air, Water, Soil, Marine, Noise, Thermal, Nuclear hazards. Solid `waste management: causes, effects and control measures of urban and industrial wastes, pollution measures, case studies, Disaster management: floods, earthquake, cyclone and landslides.

Unit IV: Social Issues and the Environment **8 hours**

Urban problems related to energy & sustainable development, water conservation, rain water harvesting, watershed management, problems related to rehabilitation – case studies, Wasteland reclamation, Consumerism and waste products - Environment Protection Act, Air, Water, Wildlife, Forest Conservation Act, Environmental legislation and public awareness.

Unit V: Human Population and the Environment **8 hours**

Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV/ AIDS, Women and Child Welfare, Role of Information Technology – Visit to local polluted site / Case Studies.

Mode of Evaluation: Tutorials / Class Tests

Name of The Course	Professional Communication	L	T	P	C
Course Code	LLL221	0	0	4	2
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Anti- requisite		50		50	100

Text Books

1 Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .
2 Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.

Reference Books

1 Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi.
2 Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGraw Hill & Co. Ltd., New Delhi.
3 How to Build Better Vocabulary by M.Rosen Blum, Bloomsbury Pub. London.
4 Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. & Distributors; Delhi.
5 Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.
6 Manual of Practical Communication by L.U.B. Pandey & R.P. Singh; A.I.T.B.S. Publications India Ltd.; Krishan Nagar, Delhi.

Unit-1	Basics of Technical Communication	6 hours
Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication		
Unit-2	**Constituents of Technical Written Communication**	**8 hours**
Words and Phrases: Word formation. Synonyms and Anti-onyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.		
Unit-3	**Forms of Technical Communication**	**8 hours**
Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes. Official Letters: D.O. Letters; Govt.		

Letters, Letters to Authorities etc. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.		
Unit-4	**Presentation Strategies**	**8 hours**
Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time-Dimension		
Unit-5	**Fundamentals of Human Relations**	**6 hours**
Intra-personal, Interpersonal and Group Relationships, Transactional Analysis Implications for Managers in Organizational Context. Formal Written Communication: Official Letters, Report, Writing: Categories Formats, Memorandums and Circulars, Agenda and Minutes, Resume, Drafting Advertisements. Enquires and Replies, Quotations, Voluntary Offers, Placing of Order, Cancellation of Order, Complains and Adjustments. Formal Verbal Communication: Group Discussion, Interview, Extempore, Business Negotiation, Public Speaking, Meeting, Toasting, Counselling, Business Presentation. Negotional Skills. Social Skills for Managers: Update of Etiquettes a Manager should observe in Various Formal and Informal Situations; The Knowledge of Body Language.		
Unit-6	**Advancement & Research**	**4 hours**
Advancement in the course, Research methodologies, research discussion & publication		

Revised Syllabus

BCA123	Data Structure	L	T	P	C
		3	0	2	4
Version No.	2				
Prerequisite	BCA104				
Objectives:	Students will be able to design the data structure.				
Expected Outcome:	After completing the this course, Students will solve the real world problem using data structure.				
Module I	**Introduction to Data Structure**				
Introduction, Basic Terminology: Data and information, ADT, Data Organization and types of Data Structure.					
Module II	**Arrays**				
Representation of Linear Arrays, Types of Arrays: 1D,2D & M-D Concept, Sorting & Searching Algorithms-Bubble, Selection, Merge, Quicksort, linear and binary search. Type of Memory Allocations, Calloc, malloc					
Module III	**Linked List**				
Concept of Linked List, Representation of linked List in memory, Memory Allocation, Garbage Collection ,Overflow and Underflow, Traversing a linked list, Searching a linked list, Insertion & Deletion in Linked List, More types of linked list: Header Linked List , Two way List and Circular linked list.					
Module IV	**Stacks, Queues**				
Concepts of Stack, Operation on Stack, Array Representation of Stack, Arithmetic Expression POLISH Notation, Concepts of Queue, Operation on Queue, Representation of queues, Other types of queue: Priority Queues, Deque and Circular queue. Recursion : factorial number, Fibonacci series and Tower of Honai					
Module V	**Introduction of Trees and Graph**				
Introduction of Trees – Binary Trees , Binary Search Trees, Types of Graph, Implementation of tree and graph					
Reference Books					
Core References:					
1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication. 2. Data Structure and algorithm using C :ByR.S.Salaria-Khanna Publication.					
Advance Reference:					
1. Fundamentals of Data structures, by Horowitz and Sahani (Galgotia publications). **2**. An introduction to data structures and application, by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).					
3. Data Structures, by Tannenbaum, (PHI).					

Revised Syllabus

BCA 124	Web Designing	L 3	T 0	P 2	C 4
Version No.	2				
Prerequisite					
Objectives:	• The student will gain knowledge behind the concepts of Web Designing as a whole and the technologies that constitute its development. By building sample applications, the student will get experience and be ready for large-scale projects.				
Expected Outcome:	• The student will gain programming skills both in basic and advanced levels.				
Module I	**Introduction and HTML**				
Basic web designing: Introduction to web browser, architecture of web browser, web page, static & dynamic web pages, home page, web-site, Web-servers & clients, www. Introduction to HTML: History, structure of HTML document, creating & executing HTML. Tags of HTML, Creating Lists & Links, Creating Bookmarks, Image tags, Tables and Frames tags. Forms and CSS: Understanding Form, <FORM> tag, creating text boxes, buttons, checkboxes, radio buttons, hidden control, password, lists & dropdown list, textarea. Submitting a form, get & post method. Creating CSS, applying CSS to HTML documents. Use of <META> Tag.					
Module II	**JavaScript**				
JavaScript: Introduction: Scripting Language, The Use of JavaScript, Using Javascript in an HTML document, <SCRIPT> Tag. Overview of Javascript Programming: Variable, Scope of variables, number & string, Operators Statements: if-else, for, while, break, continue, for-in, new, return. Arrays, JavaScript Functions & Objects, Document Object Model (DOM), Hierarchy of objects. Properties & Methods of Objects, Event Handling & Form Validation.					
Module III	**VBScript**				
Introduction, VBScript Statements and loops, Arrays, VBScript objects, VBScript layout statements, error handling, adding objects, Forms, Controls & managing transactions, VBScript event programming, Procedures & Functions					
Module IV	**ASP**				
Introduction, Variables, Data types of ASP, Statements, Request & Response Objects: Response Object - buffering page, page caching, Request Object – QueryString collection, form collection, server-variables collection, working with HTML forms, retrieving form data suing text boxes, textareas, buttons, checkboxes, select lists. Form validation, Session & Application Object.					
Module V	**Database and File system**				
ASP with Databases: Connection and data sources, creating connections with OLEDB and ODBC, connecting to SQL server with OLEDB and ODBC, connection to MS-Access, Executing SQL statements. Working with Record set, File System Object(FSO), Folder object.					
Reference Books					
1. HTML 4.0, No Experience required – E. Stephen Macj, J. Platt (bpb) 2. Completer Reference HTML - Thomas A. Powell (TMH)					

3. Dynamic HTML in action - Michele Petrovisjy (TMH)

BCA109	Principle of Management.	L T P C 3 0 0 3
Objective - To provide a basis of understanding to the students with reference to working of business organization through the process of management		
Expected Outcomes On completion of the syllabi the student will understand the basic principles of management - will acquaint himself with management process, functions and principles. Student will also get the idea about new developments in management		
Module I	**Nature of Management**	**9 Hrs**
Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization		
Module II	**Evolution of Management Thought**	**9 Hrs**
Contribution of F.W.Taylor, Henri Fayol ,Elton Mayo , Chester Barhard & Peter Drucker to the management thought. Various approaches to management (i.e. Schools of management thought)Indian Management Thought		
Module III	**Functions of Management- Part-I**	**9 Hrs**
Planning - Meaning - Need & Importance, types 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, Delegation of authority - Need, difficulties in delegation - Decentralization Staffing - Meaning & Importance Direction - Nature - Principles Communication - Types & Importance Motivation - Importance - theories Leadership - Meaning - styles, qualities & functions of leaders .		
Module IV	**Functions of Management- Part-II**	**9 Hrs**
Controlling - Need, Nature, importance, Process & Techniques , Coordination - Need – Importance		
Module V	**Strategic Management and Recent Trends in Management**	**9 Hrs**
Strategic Management :Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India **Recent Trends in Management**: Social Responsibility of Management – environment friendly management , Management of Change , Management of Crisis , Total Quality Management Stress Management , International Management		
Text Books		
1. Essential of Management - Horold Koontz and Iteinz Weibrich - McGrawhills International		
References		

1. Management Theory & Practice - J.N.Chandan
2. Essential of Business Administration - K.Aswathapa Himalaya Publishing House
6. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
7. Business Organization & Management - Dr. Y.K. Bhushan
9. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
10. Principles of Management, By Tripathi, Reddy Tata McGraw Hill

BCA121:	OBJECT ORIENTED PROGRAMMING WITH C++	L T P C 3 0 2 4
Version No.	2	
Objective:		
To introduce students to the concept of object oriented programming. The basic features of object oriented programming such as data hiding, operator overloading, inheritance are given emphasis. Solving problems, which involve object orientation using C++.		
Module I	**INTRODUCTION**	
Introduction to OOP- Overview of C++ - Classes - Structures - Union - Friend Functions - Friend Classes - Inline Functions - Constructors - Destructors - Static Members - Scope Resolution Operator.		
Module II	**POINTERS**	
Array of Objects - Pointer to Object - This Pointer - References - Dynamic Memory Allocation - Function Overloading - Default Arguments - Overloading Constructors.		
Module III	**OPERATORS**	
Operator Overloading - Member Operator Function - Friend Operator Function - Inheritance - Types of Inheritance - Protected Members - Virtual Base Class - Polymorphism - Virtual Functions - Pure Virtual Functions.		
Module IV	**CLASS**	
Class Templates and Generic Classes - Function Templates and Generic Functions - Overloading a Function Template - Exception Handling - Namespaces.		
Module V	**I/O STREAMS**	
I/O Streams - Formations I/O with ios Class Functions and Manipulators - Overloading - File I/O.		
Text Books		
1. Herbert Schildt, C++ - The Complete Reference, Third Edition -Tata McGraw Hill - 1999. 2. Bruce Eckel, Thinking in C++, Second Edition, Volume One, Pearson Education Asia, 2000.		

Name of The Course	Data Structures Lab			L	T	P	C
Course Code	BCA141			0	0	2	1
Prerequisite							
Co requisite		IA	MTE	ETE	TOT		
Anti- requisite		70		30	100		

List of Experiment:

1. Write a program to compute minimum/maximum of a given array.
2. Write a program to sort given set of numbers in ascending/descending order using Bubble Sort and analyze its complexity.
3. Write a menu-based program to perform array operations: deletion of an element from the specified position, inserting an element at the specified position, printing the array elements.
4. Write a program to search an element in the array using linear search.
5. Write a program to search an element in a 2-dimensional array.
6. Write a program to perform following operations in matrix:
    a. Addition
    b. Subtraction
    c. Multiplication
    d. Transpose
7. Write a menu-based program to perform following operations on single linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.
    d. To delete the first node from the list.
    e. To delete the last node from the list.
    f. To delete a node after a given node from the list.
    g. To delete a node at a given position from the list.
8. Write a menu-based program to perform following operations on double linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.
    d. To delete the first node from the list.
    e. To delete the last node from the list.
    f. To delete a node after a given node from the list.
    g. To delete a node at a given position from the list.
9. Write a menu-based program to perform following operations on circular linked list:
    a. To insert a node at the beginning of the list.
    b. To insert a node at the end of the list.
    c. To insert a node after a given node in the list.

d. To delete the first node from the list.
e. To delete the last node from the list.
f. To delete a node after a given node from the list.
g. To delete a node at a given position from the list.

10. Write a menu-based program to implement stack operations: PUSH, POP using array implementation of stack.
11. Write a menu-based program using functions to implement stack operations: PUSH, POP using linked implementation of stack.
12. Write a program to convert infix expression into postfix expression and then to evaluate resultAnti- postfix expression.
13. Write a program to solve Towers of Hanoi Problem.
14. Write a menu-based program to implement linear queue operations: INSERTION, DELETION using array implementation of queue.
15. Write a menu-based program to implement linear queue operations: INSERTION, DELETION using linked list implementation of queue.
16. Write a menu-based program to implement circular queue operations: INSERTION, DELETION.
17. Write a program to traverse a binary tree using PRE-ORDER, IN-ORDER, POST-ORDER traversal techniques.
18. Write a menu-based program to perform operations for a binary search tree (BST).
    a. Search an element
    b. Find minimum
    c. Find maximum
    d. Insertion
    e. Deletion
19. Write a program to traverse a graph using breadth-first search (BFS), depth-first search (DFS).
20. Write a program to sort given set of numbers in ascending/descending order using insertion sort and also search a number using binary search.
21. Write a program to sort given set of numbers in ascending/descending order using Quick sort and selection sort. Also record the time taken by these two programs and compare them.
22. Write a program to sort given set of numbers in ascending/descending order using Merge sort.

Name of The Course	Web Designing LAB	L	T	P	C
Course Code	BCA142	0	0	2	1

List of Experiment:

1. To create a basic web page consisting of various HTML tags.
2. To create HTML links.
3. To create HTML Table.
4. To create HTML list.
5. To create CSS file in HTML.
6. To create Student Registration Forms in HTML.
7. To create HTML Frame.
8. Introduction to java script like Add,DIV,Mul,Sub etc.
9. Using java script variables, data type and object.
10. Using java script function.
11. Using java script using validation in HTML forms.
12. Introduction to VB Script like Add,Div,Mul,Sub etc.
13. Using data type & variable.
14. Using VB Script loops and conditions.
15. Using VB script variable & procedures.
16. Introduction to ASP
17. WAP in ASP displaying the current date and time
18. WAP in ASP print the hours minutes and second

Name of The Course	Object Oriented Programming with C++ LAB	L	T	P	C
Course Code	BCA142	0	0	2	1

List of Experiment:

1. Write a C++ Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a C++ program to declare Struct. Initialize and display contents of member variables.
3. Write a C++ program to declare a class. Declare pointer to class. Initialize and display the contents of the class member.
4. Given that an EMPLOYEE class contains following members: data members: Employee number, Employee name, Basic, DA, IT, Net Salary and print data members
5. Write a C++ program to read the data of N employee and compute Net salary of each employee (DA=52% of Basic and Income Tax (IT) =30% of the gross salary).
6. Write a C++ to illustrate the concepts of console I/O operations
7. Write a C++ program to use scope resolution operator. Display the various values of the same variables declared at different scope levels.
8. Write a C++ program to allocate memory using new operator.
9. Write a C++ program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
10. Write a C++ program to create an array of pointers. Invoke functions using array objects
11. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.

BCA216	COMPUTER ARCHITECTURE	L T P C 3 0 0 3
Version No.	2	
Course Prerequisites:		

Objective:

To introduce students to the different functional units of a computer system and to describe the various concepts of the same.

Expected Outcome:

Students will have a good awareness of a computer's architecture; understand the concepts of arithmetic operations on integer & decimal data, the input-output process and memory management.

Module I	Register Transfer and Microoperations	

Register Transfer Language-Register Transfer-Bus and Memory Transfers-Arithmetic Microoperations-Logic Microoperations-Shift Microoperations-Arithmetic Logic Shift Unit-Basic Computer organization and design-Instruction Codes-Computer Registers-Computer Instructions- Timing and Control- Instruction Cycle- Memory Reference Instructions-Input Output and Interrupt-Complete Computer Description-Design of Basic Computer-Design of Accumulator Logic

Module II	Central Processing Unit	

Introduction-Genera Register Organization-Stack organization, Instruction Format, Addressing Modes-Data Transfer and Manipulation-Program Control.

Module III	Computer Arithmetic	

Computer Arithmetic – Addition and Subtraction – Multiplication and Division Algorithms – Floating-Point and decimal Arithmetic operations.

Module IV	Input-Output Organization	

Input–Output Organization – Peripheral devices – I/O Interface – Asynchronous Data Transfer – Modes of Transfer – Direct Memory – Access I/O Processor .

Module V	Memory Organization	

Memory Hierarchy – Associative Memory- Cache Memory -Virtual Memory .

Text Books

M. M. Mano – Computer System Architecture – 3rd Edition – PHI – 1994.

References

1. Subrata Ghoshal-Computer Architecture and Organization-First Impression-Pearson-2011

2. J. P. Hayes – Computer Architecture and Organization – McGraw–Hill – 1988 3rd Edition.

Mode of Evaluation	Assignments/Quizzes/Seminars/CAT/Term-end

Revised Syllabus

BCA212	DATABASE MANAGEMENT SYSTEMS	L T P C 3 0 2 4
Version No.	2	
Course Prerequisites:		

Objective:

To explain data management and the use of various techniques in the manipulation of data subject to various constraints. 2. To describe the entity relationship diagram and to explain the basic concepts of database recovery, concurrency control, security and integrity.

Expected Outcome:
The student will have the ability to identify data relationships and to design relational database tables adopting the normalization rules

Module I	INTRODUCTION	

Introduction: Purpose of Database systems - overall system structure – Data Model.
Relational Model: Introduction to the Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views Destroying/ altering Tables and Views

Module II	E-R MODELING	

Entity relationship model: entities and entity sets relationships - mappings constraints - primary keys - E.R diagram.
Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus - Expressive Power of Algebra and calculus.

Module III	NORMALIZATION	

Relational database design: pitfalls – Normal Forms - 1 NF, 2NF 3NF and BCNF.

Module IV	DATA MODELS	

Basic concepts of Hierarchical data model – Tree structure diagram, Network Data Model-Data Structure diagram.

Module V	BACK UP & RECOVERY	

Basic concepts of database recovery -concurrency control - Database security and integrity.
Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods(ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

Text Books

1. Henry F. Korth and Abraham Silberschatz: Database system concepts, McGraw Hill International Publication, 1988 9 Chapters 1 to 6 and 9 to 13), 2nd Edition,1991.

References

1. Jeffrey D Ullman: Principles of data Base systems, Galgotia Publishers, 2nd Edition 1994.
2. C.J. Date, An Introduction to database Systems, Third Ed., Narosa 3rd Edition 1995.

BCA213	**JAVA Programming**	L 3	T 0	P 2	C 4
Version No.	2				
Prerequisite	BCA112				
Objectives:	The aim of the course is to introduce students Core Java Concepts and to teach students the basic concepts of Java programming. This course covers preliminaries, I/O streaming and file handling and teach students how to program applets in Java, networking and allow the students to implement effectively.				
Expected Outcome:	At the end of the course the student will be able to write efficiently the java programs, can develop applets, able to access database with JDBC, work with networking protocols using java with attractive GUI .				
Module I					
Introduction - Object oriented fundamentals, History-Java and the Internet-Java Applets and Applications, Features of Java, Java Virtual Machine (JMV), Byte-Code ,JAVA buzzwords, JAVA Environments, Command Line Arguments, Java program structure, Reserved keywords, Identifiers, Literals, Operators, Separators, Variables, Declaring a variable, Scope and lifetime of variables, Data types, Type conversion, casting.					
Module II					
Control Statements, Arrays- One-Dimensional Arrays, Two-dimension Array, Vectors, Operators-Arithmetic, Boolean logical, Relational and Bitwise operators-Operator Precedence. Class :Fundamentals ,The General Form of a Class ,A Simple Declaring Objects, Assigning Object Reference Variables, Methods: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing ,Returning Objects, Recursion Introducing Access Control, Overriding Methods, Final Variables and Methods, Final class, Finalizer Methods, Abstract Methods and Class, Visibility Control, Constructors					
Module III					
String : Strings, String Constructors, String length, String Literals, String Concatenation, data types-String conversion. Inheritance : basic ,Types of Inheritance, Member Access, Creating a Multilevel Hierarchy, When Constructors Are Called Method Overriding, Why Overridden Methods?, Abstract Classes, Using final with Inheritance, Using final to Prevent Overriding . Using final to Prevent Inheritance, Packages and Interfaces.					
Module IV					
Exception Handling: Exceptions Exception hierarchy, Try, Catch, Finally, Throw.					
Module V					
Java.io Package-I/O Basics-Reading console Input-Writing console output Print Writer class-Reading and Writing files-Java I/O classes, Byte Stream Classes, Character Stream.					
Text Book: R. Naughton and H. Schildt – Java2 (The Complete Reference) – Fifth Edition – TMH – 2004.					

Reference Books	
1. K. Arnold and J. Gosling – The Java Programming Language – 3rd Edition., Pearson Edu,2005 2. David Flanagan – Java in a Nutshell: A Desktop Quick Reference for Java Programmers– O'Reilly & Associates, Inc. 1999 3. Bruce Eckel –Thinking in Java – Prentice Hall, 2nd Ed 2002.	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

BCA211	Introduction to Algorithm Analysis and Designing	L	T	P	C
		3	1	0	4
Version No.	2				
Objectives:	To introduce students, the concepts of algorithm analysis for find out the space and time complexity of different algorithms. Different design techniques such as greedy method, divide and conquer, backtracking, dynamic programming, branch and bound are to be studied for finding the solution to the different problems. It also provides an insight into the basic concepts of NP and NP-hard problems and their relevance in research.				
Expected Outcome:	On completion of this subject the student shall be able to find out the efficiency of algorithms for different problems.				
Module I	**Introduction to Algorithms**				
Introduction to Algorithms & Analysis- Design of Algorithms, Growth of function, Complexity of Algorithms, Asymptotic Notations, Recurrences. **Sorting:** Insertion Sort, Quick Sort, Merge Sort, Radix Sort.					
Module II	**Advance Data Structure**				
Advanced Data Structure: Binary Search Trees,Red Black Trees, B-Tree, Fibonacci, Heap.					
Module III	**Advance Design and Analysis Techniques**				
Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound.					
Module IV	**Graph Algorithms**				
Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path.					
Module V	**Special Topics in AAD**				
String Matching, Introduction of NP-Hard and NP-Completeness , Matrix Operations, Number Theoretic Algorithms.					
Text Book: T. Cormen, C.E. Leiserson, R.L. Rivest & C. Stein – Introduction to Algorithms – PHI – 2nd Edition, 2005.					
Reference Books					
1. Knuth E. Donald, Art of Computer Programming Sorting and Searching Vol3, Second Edition, Pearson Education. 2. Brassard Bratley, "Fundamental of Algorithms", PHI 3. A V Aho etal, "The Design and analysis of Algorithms", Pearson Education 4. Adam Drozdek, "Data Structures and Algorithms in C++", Thomson Asia				
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination				
Recommended by the Board of Studies on:					
Date of Approval by the Academic Council:					

BCA 215	Computer Based Numerical Technique	L T P C 3 0 0 3
Objectives:	The course will focus on applications different numerical techniques to problems of computer world. The topics covered in the course will include:	
	□ Different methods to equation solving.	
	□ Differential equations solving techniques.	
	□ Numerical integration & differentiation methods.	
	□ Statistics computation methods.	
Expected Outcome:	At the end of this course, students will be able to: Explain and compare a variety of equation solving techniques.	
	Summarize, analyze, and relate different solving techniques in writing.	
	Able to solve differential equations with help of computer programming.	
Module I	**Introduction of numerical techniques**	
Numbers and their accuracy, Computer Arithmetic, Mathematical preliminaries, Errors and their Computation, General error formula, Error in a series approximation; Algebraic and Transcendental Equation solving: Bisection Method, Newton-Raphson method, Iteration method, Method of false position, Methods of finding complex roots, Muller's method, Rate of convergence of Iterative methods, Polynomial Equations.		
Module II	**Data interpolation and methods**	
Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula; Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation.		
Module III	**Numerical Integration and Differentiation**	
Introduction, Numerical differentiation, Numerical Integration: Trapezoidal rule, Simpson's 1/3 and 3/8 rule, Boole's rule, Waddle's rule		
Module IV	**Differential equation Solving**	
Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta Methods, Predictor Corrector Methods, Automatic Error Monitoring and Stability of solution		
Module V	**Statistical techniques & computation**	
Frequency chart, Curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves etc, Data fitting with Cubic splines, Regression Analysis, Linear and Non linear Regression, Multiple regression, Statistical Quality Control methods.		
Reference Books		
Text Books:		
□ Raja Raman V, Computer Oriented Numerical Methods, Prentice Hall.		
□ Grewal B. S., Numerical Methods in Engineering and Science, Khanna Publishers, Delhi.		
□ Gupta S. P., Statistical Methods, Sultan and Sons.		
Reference Books:		
□ Gerald & Wheatley, Applied Numerical Analyse, AW.		
□ Jain, Iyengar and Jain, Numerical Methods for Scientific and Engineering Computations,		

New Age Int.

BCA214	**PRINCIPLES OF ACCOUNTING**	L T P C 3 0 0 3
Version No.		
Course Prerequisites:		
Objective:		
1. To explain the basic concepts of the double entry system in an organization and to find out its financial position. 2. To explain how branch accounts are analyzed and maintained and to differentiate between admission and retirement of partnership firms		
Expected Outcome:		
1. Students will have an understanding of how financial accounts in an organization is maintained		
Module I	**BASIC ACCOUNTS**	
Basic Accounting Concepts and Conventions – Double entry book keeping – Journal – Ledger – Trial Balance – Final Accounts (simple problems only) – Depreciation Accounting – SLM and WDV methods – Change in the method of Depreciation.		
Module II	**STATEMENTS**	
Single entry – Statement of Affairs – Preparation of final statement of accounts.		
Module III	**BRANCH ACCOUNTS**	
Branch accounts (Excl. Foreign Branches) – Debtors system – Stock and debtors system – Final accounts of the HO incorporating the branch figures.		
Module IV	**PROFITS**	
Departmental accounts – Inter departmental profits – Royalties..		
Module V	**PARTNERSHIPS**	
Partnership accounts – Admission of a partner – Retirement of a partner – Death of a partner – Dissolution of a Firm – Insolvency of a partner.		
Text Books		
1. R.L. Gupta and Radhaswamy, Advanced Accountancy, Volume one, Sultan Chand & Co., 8th Edition 1994.		

Name of The Course	Introduction to Algorithm Analysis design LAB	L	T	P	C
Course Code	BCA241	0	0	2	1

List of Program

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n.
2. Sort a given set of elements using merge sort method and determine the time required to sort the elements. Repeat the experiment for different of values of n.
3. Write a program to obtain the topological ordering of vertices in a given digraph.
4. Implement travelling salesman problem.
5. Implement the knapsack problem (0/1).
6. Print all the nodes reachable from a given starting node in a digraph using BFS method.
7. Check whether a given graph is connected or not using DFS method.
8. Write a program to implement binary search using divide and conquer technique
9. Write a program to implement insertion sort using decrease and conquer technique
10. Find minimum cost spanning tree of a given undirected path using a Prim's algorithm.
11. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm

Name of The Course	Java Programming Lab	L	T	P	C
Course Code	BCA243	0	0	2	1

List of Experiment:

1. Write a program that will print a "hello java" message on the screen.
2. Write a program to read a string from the command line and display the string on the screen.
3. Write a program to read an integer from the command line and calculate square root of that value.
4. Write a program to read an integer value through Scanner class and check whether it is even or odd.
5. Write a program to create constructor of a class and initialize values in it and later print them.
6. Write a java code to implement the concept of method overloading.
7. Write a java code to implement the concept of constructor overloading.
8. Write a java code to implement the concept of simple inheritance, multilevel inheritance, and hierarchical inheritance.
9. Write a program to show how method overriding is implemented in java.
10. Write a program to implement the concept of abstract classes.
11. Write a program to implement multiple inheritances using interface.
12. Write a java code to demonstrate the concept of inner classes.
13. Write a java code to show both the uses of "super" keyword.
14. Write a program to create your own package and import that package in a program.
15. Write a java program to show the use of various string functions like concat, indeOf.
16. Write programs for Exception handling using try, catch, throw and finally.

17 Write a program to read a single character from keyboard using Buffered Reader class and print it

Name of The Course	Database Management System Lab	L	T	P	C
Course Code	BCA242	0	0	2	1

LIST OF EXPERIMENTS

1) Implement Data Definition language Statements.
2) Implement Data Manipulation Statements.
3)Implement SELECT command with different clauses.
4)Implement various type of Integrity Constraints on database.
5)Implement SINGLE ROW functions (Character, Numeric, Date functions) and GROUP functions (avg, count, max, min, sum).
6)Implement various type of SET OPERATORS (Union, Intersect, Minus)
7)Implement the concept of grouping of Data and Subqueries.
8)Implement the concept of Data Control Language (DCL), Transaction Control Language(TCL).
9)Implement Simple and Complex View.

Value Added Experiments

10Create a Database for Banking Sector and implement various queries on it.
11 Create a Database for Customer Sale/purchase and implement various queries on it.

Revised Syllabus

BCA 221	Operating System	L	T	P	C
		3	0	0	3
Version No.	2				
Prerequisite					
Objectives:	To provide the fundamental principles of modern operating systems that explores design aspects of modern operating systems.				
Expected Outcome:	On completion of this course the student should be able to understand and evaluate operating system implementations, Develop system software modules, Write and debug concurrent programs, Debug complex systems and low-level software and Work with distributed and real time OS.				
Module I	**Fundamentals of Operating System:-**				
Operating System and Function, Evolution of Operating System, System Software**,** OS services and Components: Multitasking , Multiprogramming, Multiprocessing, Time Sharing, Buffering, Spooling, Distributed OS. Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.					
Module II	**Process Management and Concurrency Control**				
Concept of process and threads: Process states, Process management, Critical Section, Problem, Semaphores, Classical Problems in Concurrency, Inter Processes Communication, Process Generation, Process Scheduling. Process Synchronization – The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock – System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.					
Module III	**CPU Scheduling:**				
Scheduling Concept, Performance Criteria Scheduling Algorithm, Evolution, Multiprocessor Scheduling. Deadlock: System Model, Deadlock Characterization, Prevention, Avoidance and Detection,					
Module IV	**Memory Management**				
Memory partitioning: Swapping, Paging, Segmentation Virtual memory: Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts					
Page replacement algorithms, Allocation algorithms, Example OS : Linux					
Module V	**I/O Management & Disk Scheduling:**				
I/O Devices and The Organization of I/O Function, I/O Buffering, Disk I/O, Operating System Design Issues. File System: File Concept, File Organization and Access Mechanism, File Directories, File Protection, File Sharing, Implementation Issues. Linux System -Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS iOS and Android – Architecture and SDK Framework, Media Layer, Services Layer, Core OS					

Layer, File System
Reference Books
1. Operating System Concepts (7th Ed) by Silberschatz and Galvin, Wiley, 2000.
2. Operating Systems (5th Ed) – Internals and Design Principles By WilliamStallings, Prentice Hall,
3. Modern Operating Systems by Andrew S Tanenbaum, Prentice Hall India, 1992.
4. Operating Systems (3rd edition) by Gary Nutt, Nabendu Chaki, SarmishthaNeogy, Pearson
5. Operating Systems Design & Implementation Andrew S. Tanenbam, AlbertS. Woodhull Pearson
6. Operating Systems Achyut S. Godbole Tata Mc Graw Hill
7. Operating Systems D.M.Dhardhere Tata Mc Graw Hill

Revised Syllabus

BCA224	Software Engineering	L	T	P
		3	0	2
Prerequisite	Knowledge of Set Theory and Artificial Intelligence is desirable.			
Objectives:	**This course should help students in understanding:**			
Expected Outcome:	Accomplishments of the student after completing the course: At the end of the work student will be able To identify, formulate, analyze, and solve problems, as well as identify the computing requirements appropriate to their solutions. To design, implement, and evaluate software-based systems, components, or programs of varying complexity and communicate effectively with a range of audiences. An understanding of professional, ethical, legal, security, and societal issues and responsibilities appropriate to the discipline.			
Module I	**INTRODUCTION**			
INTRODUCTION: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Selection of Software Process models.				
Module II	**Requirement Engineering**			
Requirement Engineering Process: Elicitation, Analysis, Documentation, Analyzing a problem, creating software specification document, review for correctness, consistency, and completeness, Management of User Needs, Feasibility Study, Characteristics and components SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.				
Module III	**Software Design**			
Software Design: Refining the software Specification; Software design, fundamental design concept for data, Abstraction, Modularity, Software architecture, Cohesion and Coupling, Architectural design and procedural design, Data flow oriented design, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design, creating design document: Review of conformance for software requirements and quality.				
Module IV	**Coding & Testing**			
Coding: Relationship between design and implementation, Implementation issues and programming support environment; Coding the procedural design, Good coding style and review of correctness and readability, Structured Programming, need for structured programming, Coding standards, Coding style, Maintainability of programs, Code documentation – Code efficiency **Testing :** Software testing, Testing Objectives, Levels of testing– Unit Testing, Integration Testing, System testing, Acceptance Testing, Verification Vs Validation, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing , Incremental Vs Nonincremental testing, Structural Testing (White Box Testing), Functional Testing (Black Box Testing). Alpha Beta Testing, Smoke Testing				
Module V	**Maintenance and Project Management**			
Maintenance: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Function Point (FP) Based Measures, Cyclomatic Complexity Measures, Software Risk Analysis and Management. Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection – Risk Management-Risk Identification-RMMM Plan-CASE TOOL				

Reference Books	
Text Book(s): 1. Roger S Pressman," Software Engineering – A Practitioner's Approach", McGraw Hill, USA, 2007. 2. Sommerville I, "Software Engineering", Pearson Education India, New Delhi, 2006. **Suggested Additional Reading Book(s):** 1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication. 2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers. 3. Pankaj Jalote, Software Engineering, Wiley	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination

BCA 222	.NET Technology	L	T	P	C
		3	0	2	4
Version No.	2				
Objectives:	• The student will gain knowledge in the concepts of the .NET framework as a whole and the technologies that constitute the Framework. • By building sample applications, the student will get experience and be ready for large-scale projects.				
Expected Outcome:	• The student will gain programming skills both in basic and advanced levels.				
Module I	**Introduction**				
Introducing C#, Understanding .NET, Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, Arrays, Strings, Structures, Enumerations, Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading, Delegates, Events, Errors and Exceptions, Defining classes and class members. Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler. Namespaces Collections, Comparisons and Conversions, Delegates and Events.					
Module II	**C#**				
Getting Started with .Net Framework, Exploring Visual Studio .NET, Inside a C# Program, Data Types, Statements, Arrays, Using Strings, Objects, Classes and Structs, Properties, Inheritance, Indexers, Delegates, Events, Namespaces, Generics, Collections and Data Structures, Exception Handling, Threading, Using Streams and Files, Reflection, Assemblies, versioning, Windows Forms, Controls, Data binding to Conrols, Advanced Database Programming using ADO.net, Using GDI +,Networking,.net Remoting, Manipulating XML.					
Module III	**VB.Net**				
Creating Applications with Visual Basic.NET, Variables, Constants, and Calculations, Making Decisions and Working with Strings, Lists, Loops, Validation, Sub Procedures and Functions, Multiple Forms, Standard Modules, and Menus, Arrays, Timers, Form Controls, File Handling, Exception Handling, Working with Databases, Advanced Database Programming using ADO.net, Classes, Generics, Collections, Inheritance, Custom Controls, Packaging & deployment, Using Crystal Reports.					
Module IV	**ASP.NET**				
Building a Web Application, Examples Using Standard Controls, Using HTML Controls, Validating Form Input Controls using Validation Controls, Understanding Applications and State, Applying Styles, Themes, and Skins, Creating a Layout Using Master Pages, Binding to Databases using Controls, Data Management with ADO.net, Creating a Site Navigation Hierarchy, Navigation Controls , Membership and Role Management, Login Controls, Securing Applications, Caching For Performance, Working with XML, Using Crystal Reports in Web Forms.					
Module V	**DBMS**				
Databases: Introduction, Using SQL to work with database, retrieving and manipulating data with SQL, working with ADO.NET, ADO.NET architecture, ASP.NET data control, data source control, deploying the web site. Crystal reports. LINQ: Operators, implementations, LINQ to objects, XML, ADO.NET, Query Syntax.					
Reference Books					
1. Visual studio 2010 - A beginners guide - Joseph Mayo					
3. Jeffrey R. Shapiro “The Complete Reference Visual Basic .NET” Tata Mcgraw Hill (2002 Edition).					
4. Pro ASP.NET 4 in C# 2010, MacDonald and Freeman					
5. Visual Studio 2010 and .NET 4 Six-in-One (Wrox Programmer to Programmer)					

BCA 223	Computer Networking	L	T	P	C
		3	0	0	3
Version No.	2				
Objectives:	To teach fundamental concepts of networks and give hands on training of network installation and configuration.				
Expected Outcome:	Students should be able to understand the basic of networking from the user's, developer's and administrators perspective.				
Module I	**Basic Concepts , Network Reference Models**				
Basic Concepts: Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks (LAN,WAN,PAN). Network Topologies (Bus, Star, Ring, Star Bus, Star Ring and Physical Mesh) , **OSI and TCP/IP Models:** Layers and their functions, comparison of models.					
Module II	**Physical Layer**				
Basic function and design issues of physical layer, **Signals:** Analog, Digital, Digital Transmission – Coding, Sampling, Analog Transmission, Modulation of digital and analog signals, attenuation, distortion, noise, throughput, propagation speed and time, **Transmission Media:** Guided and unguided,					
Module III	**Data Link and Network Layer**				
DLL: Basic functions and design issues of DLL, Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching. Data link control protocols: Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures. **Network Layer:** Repeaters, bridges, gateways, routers, network Layer design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.					
Module IV	**Transport and Application Layer**				
Transport layer: Process- to- Process delivery, Data traffic, Congestion and error Control, Quality of service (QOS) **Application Layer:** Client- Server model, Domain name system-domain name space, distribution of name space, DNS in internet E-mail, SMTP, File Transfer, FTP, HTTP, World Wide Web. **Multimedia fundamentals**: Streaming audio/video - stored and live, real time interactive audio/video.					
Module V	**Network Administration**				
Analyzing the technical support structure(Network manager support, End-user Support), Analyzing the current Network Management, Managing Network Connections, Installing and configuring Network adapters, Installing and Configuring TCP/IP Protocol, Managing network bindings, Sharing files and Printers, Building Internet and Intranet Infrastructure, IP address scheme, assigning IP addresses					
Reference Books					
1.A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4 thEd. 2003. 2.Behrouz A.Forouzan, "Data Communication and Networking", Tata MCGraw Hill,					
3.William stallings, "Data and computer communications", Pearson education Asia, ,					
4. MCSE: Networking Essentials Study Guide -- Tata McGrawHill Publication					

Name of The Course	Graph Theory	L	T	P	C
Course Code	BCA225	3	0	0	3

Course Objectives:

The main objective of this course is to introduce graphs as a powerful modelling tool that can be used to solve practical problems in various fields. To achieve this goal, the course introduces the main concepts of graph theory, graph representations and the basic classes of graphs. Several famous graph problems and associated algorithms are also covered. At the end of this course, the student should be able to apply the abstract concepts of graph theory in modelling and solving non-trivial problems in different fields of study.

Course Outcomes

CO1	Understand the basic ideas of graph theory
CO2	Understand the basics of trees and algorithms
CO3	Analyze the matching and traversibility
CO4	Analyze the concept of matrix graph representation
CO5	Analyze concept of colouring and planarity.

Unit-1	**Introduction to Graph Theory**	**6 hours**
Graphs – Isomorphism of graphs – Sub graphs - Degree of a vertex – independent sets and coverings - intersection graphs - Connected graphs and Shortest paths: Walks – Trails - Paths - Connected graphs – Distance - Cut-vertices - Cut-edges – Blocks – Connectivity - Weighted graphs - Shortest path algorithms - Eulerian graphs - Hamilton graphs - Travelling sales man problem.		
Unit-2	**Trees**	**8 hours**
Trees - Fundamental circuits – Distance – Diameters - Radius and Pendent vertices - Rooted and Binary trees - Spanning trees - Fundamental circuits - Spanning trees in a weighted graph - Primes, Kruskal and Dijkstra algorithms.		
Unit-3	**Matching and Traversibility**	**8 hours**
Bipartite graphs- General graphs - Weighted matching - Eulerian graphs - Hamiltonian graphs.		
Unit-4	**Matrix representation of graph**	**8 hours**
Vector space of a graph and vectors - Cut set vector - Circuit vector - Circuit and Cut set subspaces - Matrix representation of graph- Incidence matrix - Circuit matrix - Path matrix - Cut-set matrix and Adjacency matrix. Colouring - Covering and Partitioning of a graph.		
Unit-5	**Planarity and Colouring**	**8 hours**
Vertex colourings: Chromatic number and cliques - Greedy colouring algorithm - Chordal graphs - Brook's theorem - Edge colourings: Gupta-Vizing theorem - Class-1 graphs and class-2 graphs - Equitable edge-colouring - Planar graphs: Duality - Eulers formula - Polyhedrons and planar graphs - 4-color-theorem - Directed graphs: Out-degree - in-degree – Connectivity – Orientation - Eulerian directed graphs - Hamilton directed graphs – Tournaments.		

Text Book (s)

1. J.A.Bondy and U.S.R.Murty: Graph Theory and Applications (Freely downloadable from Bondy's website; Google-Bondy)
2. D.B.West: Introduction to Graph Theory, Prentice-Hall of India/Pearson, 2009 (latest impression)
3. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.
4. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley, 1994.

5. L.R.Foulds , “Graph Theory Applications”, Springer ,2016.

Reference Book (s)

1. Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers, 1995.
2. Diestel, R, “Graph Theory”, Springer,3rd Edition,2006.
3. Kenneth H.Rosen, “Discrete Mathematics and Its Applications”, Mc Graw Hill , 2007.
4. Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians” , Prentice Hall of India, 1996.
5. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 1985.

Name of The Course	Operating System Lab	L	T	P	C
Course Code	BCA251	0	0	2	1
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Anti- requisite		70		30	100

LIST OF EXPERIMENTS

1. Study of basic Commands in Linux Operating System
2. Shell programming using control statements
3. Shell programming using loops, patterns, expansions and substitutions
4. Write programs using the following system calls (fork, exec, getpid, exit, wait, close, stat, opendir, readdir).
5. Write programs using the I/O system calls (open, read, write, etc).
6. Simulation of Linux commands (ls, grep etc.)
7. Implementation of CPU Scheduling Algorithms (FCFS, SJF, RR, Priorty).
8. Implementation of Page Replacement Algorithms (LRU, OPT, FIFO).
9. Implementation of memory allocation algorithms (First Fit, Best Fit, Worst Fit)
10. Implement the Producer – Consumer problem using semaphores.
11. Simulation of Shared Memory Concept.
12. Implementation of bankers Algorithm.
13. Implementation Disk Scheduling Algorithms

Course Code: BCA253	Computer Networks Lab	L	T	P	C
Version No. 01		**0**	**0**	**2**	**1**
erequisite/Exposure					
Co-requisites					

COURSE OBJECTIVE:

This course covers the concepts of data communication and computer networks.

It comprises of the study of the standard models for the layered protocol architecture to communicate between autonomous computers in a network and also the main features and issues of communication protocols for different layers. Topics covered comprise of introduction to OSI and TCP/IP models also.

COURSE OUTCOMES:

On successful completion of the course, the student will be able to:

1. Describe the hardware, software components of a network and their interrelations.
2. Compare OSI and TCP/IP network models.
3. Describe, analyze and compare different data link, network, and transport layer protocols.
4. Design/implement data link and network layer protocols in a simulated networking environment.

LIST OF EXPERIMENTS:

1. Write a socket Program for Echo/Ping/Talk commands.
2. Create a socket (TCP) between two computers and enable file transfer between them.
3. Create a socket (UDP) between two computers and enable file transfer between them.
4. Write a program to implement Remote Command Execution. (Two M/Cs may be used)
5. Write a code simulating ARP /RARP protocols.
6. Create a socket for HTTP for web page upload and download.
7. Write a program for TCP module implementation.(TCP services)
8. Write a program for File Transfer in client-server architecture using following methods. (a) RS232C (b) TCP/IP
9. Write a program to implement RMI (Remote Method Invocation)

10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer. i. Shortest path routing ii. Flooding iii. Distance vector

Implement client in C and server in Java and initiate communication between them

Name of The Course	**.Net technology Lab**	**L**	**T**	**P**	**C**
Course Code	**BCA252**	**0**	**0**	**2**	**1**

List of Experiments

1. Write a program in C# to add, subtract, multiply, and divide two numbers.
2. Write a program in C# to compute the area of a circle.
3. Write a program in C# to compute the sum of first 100 numbers.
4. Write a program in C# that uses Building class and displays the following output:
5. house has:
    a. floors
    b. occupAnti-s
6. 2500 total area
7. 625 area per person
8. Write a program in C# to handle divide- by-Zero exception.
9. Write a program in Visual Basic to compute the factorial of a number.
10. Write a program in Visual Basic to find the roots of quadratic equation.
11. Write a program in Visual Basic to convert temperature from Fahrenheit to Celsius and vice versa.
12. Write a program in Visual Basic to compute the area of triangle and rectangle.
13. Value Addition Experiments
14. Write a program to display holiday in calendar using ASP.Net.

Write a program to display the phone number of an author using database

Course Code: BCA254	**Software Engineering LAB**	L	T	P	C
Version No. 01		**0**	**0**	**2**	**1**
	List of Activities				

1. Write down the problem statement for a suggested system of relevance.
2. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.
3. To perform the function oriented diagram: Data Flow Diagram (DFD) and Structured chart.
4. To perform the user‘s view analysis for the suggested system: Use case diagram.
5. To draw the structural view diagram for the system: Class diagram, object diagram.
6. To draw the behavioral view diagram : State-chart diagram, Activity diagram
7. To perform the behavioral view diagram for the suggested system : Sequence diagram, Collaboration diagram
8. To perform the implementation view diagram: Component diagram for the system.
9. To perform the environmental view diagram: Deployment diagram for the system.
10. To perform various testing using the testing tool unit testing, integration testing for a sample code of the suggested system
11. Perform Estimation of effort using FP Estimation for chosen system.
12. To Prepare time line chart/Gantt Chart/PERT Chart for selected software projec

		L	T	P	C
BCA 311	**Management Information System**	3	0	0	3
Objectives:	To make the desired information available in the right form to the right person and at the right person , To supply the required information at reasonable cost, To use the most efficient method of processing data.				
Expected Outcome:	At the end of this course, students should be able to:				
	Integrate into business situations and analysis, and evaluate both theory and practice relevant to Management information systems, Fully explain the relationship among and between information systems and management , Analyze how technology can be used to synthesize complex data to make sound business decisions , Fully understand how cloud computing will change all aspects of MIS from hardware and software to the hiring of technology personnel and managers , Prepare processes, in conjunction with technology personnel, to use MIS for competitive advantage,				
Module I	**Foundation of Information System:**				
Introduction to Information System and MIS, Decisionsupport and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.					
Module II	**Information Technology**				
A manager's overview, managerial overviews, computer hardware &software, DBMS, RDBMS and Telecommunication.					
Module III	**Conceptual system design:**				
Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.					
Module IV	**Detailed system design**				
Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, document the detailed design revisit the manager user.					
Module V	**Implementation evaluation and maintenance of the MIS:**				
Plan the implementation, acquire floor space and plan space layouts, organize for implementation,					

develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development.
Reference Books
1. Management Information System; O Brian; TMH
2. Management Information System by Davis Olson Mac Graw Hill
3. Management Information System by Stasllings,(Maxwell Mc Millman Publishers)
4. Information System; a Management Perspective; Alter Addison Wesley

Revised Syllabus

BCA 312	Computer Graphics	L 3	T 0	P 2	C 4
Version No.	2				
Prerequisite	BCA104				
Objectives:	To introduce students to the basics of computer graphics.				
Module I	**Introduction**				
Overview of Graphics Systems**:** Video display devices, Raster-Scan System, Random-Scan, Systems. Random-Scan Systems Graphics monitors and work stations. Input devices: Hard copy devices. Graphics software Cathode Ray Tube, Quality of Phosphors, CRTs for Color Display, Beam Penetration CRT, The Shadow - Mask CRT, Direct View Storage Tube, Tablets, The light Pen, Three Dimensional Devices					
Module II	Output primitives**:**				
Line drawing algorithms circle generation algorithms. Ellipse Generating, Algorithm. Pixel Addressing. Filled-Area Primitives. Fill Area Function, Cell Array, Character, Generation.					
Module III	Attributes of Output Primitives				
: Line Attributes, Curve Attributes, Color and Gray-Scale levels. Area-Fill Attributes, Character Attributes. Bundled attributes. Inquiry functions. Two-dimensional geometric transformations: Basic transformations.					
Module IV	Transformation				
Homogenous coordinates, composite transformations, other transformations. Affine transformations, transformation functions, Roster methods for transformations.					
Module V	**Viewing and Clipping**				
Two-dimensional viewing**:** The viewing pipeline, viewing transformation, viewing functions. Line clipping, Cohen Sutherland line clipping, Liang Barsky line clipping Polygon clipping**:** Sutherland-Hodgman polygon clipping, Weiler Amerton polygon clipping. Need for hidden surface removal, The Depth - Buffer Algorithm, Properties that help in reducing efforts, Scan Line coherence algorithm, Span - Coherence algorithm, Area-Coherence Algorithms, Warnock's Algorithm, Priority Algorithms					

Reference Books	
1. D. Hearn, P. Baker, "Computer *Graphics - C Version",* 2nd Edition, Pearson Education, 1997 2. Heam Donald, Pauline Baker M: "Computer Graphics", PHI 2nd Edn. 1995. 3. Harrington S: "Computer Graphics - A Programming Approach", 2nd Edn. Mc GrawHill. 4. Shalini Govil-Pai, Principles of Computer Graphics, Springer, 2004.	
Mode of Evaluation	Quiz/Assignment/ Seminar/Written Examination
Recommended by the Board of Studies on:	
Date of Approval by the Academic Council:	

BCA 314	Mobile Application Development	L	T	P	C
		3	0	0	3
Objectives:	To provide students with the tools and knowledge necessary to create applications that can run on mobile devices.				
Module I	**Mobile Application Development Overview**				
Mobile (Cellular) Telephony: mobile devices/radio communications, 1G/2G/3G/4G, carriers device and carrier dependence and independence, **Categories of Mobile Apps:** phone-related, Internet/Web-based, games, GPS-based, standalone utilities, integration utilities, Platform Overview, Mobile Devices Profiles, Mobile Software, Options for development, Common UI Elements,					
Module II	**Architecture, interfaces,**				
Software architecture, application models, user interfaces, **Data storage:** ordinary UNIX File System files, SQ Lite Databases, object persistence. **Networking:** Internet, Bluetooth, Near-Field Communication (NFC). **On-board instruments:** accelerometers, compass, GPS, etc. **Specific devices:** Apple iOS (iPhone/ iPad/ iPod Touch), Android devices,					
Module III	**Platforms and Develop environments**				
Operating platforms: Apple iOS, Google Android, windows iPhone7					
Development environments: Xcode /Cocoa Frameworks/Objective-C/ iOS simulator, Eclipse (w. Android Development Tools)/Android Application Framework/Java/Android device emulator					
Module IV	**Introduction to Android Programming**				
Installing Android Development Tools , Core Java Concepts, Introduction of android Framework, Android Development Tools, Creating Android Application and Activities, All controls, View Groups(Gallery,Gridview..etc),					
Module V	**Android Application Development**				
Working with Menus, Intent, 2DGraphics, 2D animation, Audio, Video, Preferences(with all controls), Using File System (from Internal and External), Accessing Sdcard, Database and Content Provider Maps, Geo-coding and Location Based Services, Parsing: Dom Parsing, Json Parsing, Sax Parsing, Pull Parsing					

Reference Books	
2. Pogue, iPhone: The Missing Manual (4th ed.) , Pogue Press, 2010. ISBN: 978-1449393656 3. Guy Hart-Davis, How to Do Everything iPod, iPhone & iTunes (5th ed.), McGraw-Hill Osborne Media, 2009. ISBN: 978-0071630245 4. W. Frank Ableson; Robi Sen; Chris King; C. Enrique Ortiz, Android in Action (3rd ed.), Manning Publications, 2012. ISBN: 978-1-61729-050-3 ISBN: 978-0-13-705842-6	

Revised Syllabus

BCA 316	**Software Project Management**	**L T P C** **3 0 0 3**
Objectives:	• Define and highlight importance of software project management. • Describe the software project management activities •planning and tracking and oversight in the implementation of the software project management process.	
Expected Outcome:	• Develop a project management plan (PMP). • Track project execution through collecting artifacts and metrics according to procedures described in PMP. • Revise PMP	
Module I	Software engineering problem and software product, software product attributes, Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, Project management cycle, SPM framework, types of project plan	
Module II	PROJECT EVALUATION Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.	
Module III	. ACTIVITY PLANNING Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.	
Module IV	MONITORING AND CONTROL Introduction, creating the frame work, collecting the data, visualizing progress, cost monitoring,earned value, prioritizing monitoring, getting the project back to target, change controlPriortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.	
Module V	MANAGING PEOPLE AND ORGANIZING TEAMS	

	Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.
Reference Books	1. Bob Hughes, Mikecotterell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004. 2. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001. 3. Royce, "Software Project Management", Pearson Education, 1999. 4. Jalote, "Software Project Manangement in Practive", Pearson Education, 2002.

BCA 344	**Mobile Application Development -LAB**	L	T	P	C
		0	0	2	3
Objectives	The ANDROID Application Development Lab needed to implement rich Android applications for the Android mobile platform. Student will build the code, compile, execute, and debug mobile applications using the Java for Android programming language and Eclipse to develop programs using advanced programming concepts.				
	1. Introduction to mobile technologies and devices 2. Android platform and applications overview 3. Setting Android development environments 4. Writing Android applications 5. Understanding anatomy of an Android application 6. Managing application resources 7. Essentials of Android user interface design Model Practical Examination I Cycle II User interface design elements, events, and dialogs 8. User interface design layouts 9. Working with texts and shapes 10. Working with animations 11. Using Android location based APIs 12. Using Android storage APIs 13. Using Android web APIs				

Name of The Course	**Computer Graphics Lab**	**L**	**T**	**P**	**C**
Course Code	**BCA342**	**0**	**0**	**2**	**1**
S. NO.	**List of Experiments**				
1	Study of basic graphics functions defined in “graphics.h”				
2	To implement DDA(Digital Differential Algorithm) for line drawing				
3	To implement Bresenham’s algorithm for line drawing				
4	To implement Bresenham's algorithm for circle drawing				
5	To implement Midpoint algorithm for circle drawing				
6	To implement Midpoint algorithm for ellipse drawing				
7	To perform 2D Rotation Transformation				
8	To perform 2-D Translation Transformation				
9	To perform 2-D Scaling Transformation				
10	To perform 2-D Reflection Transformation				
11	To perform a composite Transformation using 2D Transformation				
12	To implement Cohen-Sutherland 2D Line clipping				
13	To implement Sutherland Hodgeman Polygon clipping algorithm				
14	To implement window-viewport mapping				
15	**Value Addition Experiments**				
16	Designing simple animation using transformations				

Electives

BCA 228	**Advance DBMS**	L	T	P	C
		3	0	0	3
Prerequisite					
Objectives:	To study the further database techniques beyond which covered in the second year, and thus to acquaint the students with some relatively advanced issues.				
Expected Outcome:	Student will be able to understand advance database management system techniques at the end of the semester.				
Module I	**OODBMBS & ORDBMS and Advance Database Management System –Concepts & Architecture**				
OODBMBS & ORDBMS: Overview of Object-Oriented concepts & characteristics, Objects, Database design for ORDBMS, Comparing RDBMS, OODBMS & ORDBMS.					
Advance Database Management System –Concepts & Architecture: Spatial data management, Web based systems-Overview of client server architecture, Databases and web architecture, N-tier ,Architecture, Business logic – SOAP, Multimedia databases , Mobile database					
Module II	**Parallel databases and Distributed Databases**				
Parallel databases: Introduction, Parallel database architecture , I/O parallelism , Inter-query and Intra-query parallelism, Interoperation and Intra-operational parallelism , Design of parallel systems.					
Distributed Databases: Introduction, DDBMS architectures , Homogeneous and Heterogeneous, Databases , Distributed data storage , Distributed transactions , Commit protocols , Availability , Concurrency control & recovery in distributed databases , Directory systems.					
Module III	**Knowledge base Systems and** Data **Warehousing**				
Knowledge base Systems: Integration of expert in database, application & object database overview.					
Data Warehousing: Introduction to Data warehousing , Architecture , Dimensional data modeling- star, snowflake schemas, fact constellation , OLAP and data cubes , Operations on cubes , Data preprocessing -need for preprocessing , data cleaning,					
Module IV	**Data Mining**				

Introduction to data mining , Introduction to machine learning , Descriptive and predictive data mining , outlier analysis, clustering – k means algorithm , Classification - decision tree, association, rules - apriori algorithm , Introduction to text rnh.mg, Bayesian classifiers.
Text Books
1. Database system concepts'*, 5 th Edition –by Abraham Silberschatz, Henry Korth, S,Sudarshan, (McGraw Hill International) 2. Data Mining: Concepts and systems'*, by Jiawei nan, Micheline Kamber, (Morgan Kaufmann publishers)
Reference Books
1. Database systems: "Design implementation and management", by Rob Coronel, 4th Edition, (Thomson Learning Press)
2. Database Management Systems by Raghu Ramkrishnan, Johannes Gehrke Second Edition, (McGraw Hill International).

BCA 229	**Advance DBMS LAB**	L	T	P	C
		0	0	2	1
Objectives:	• To explore the features of a Database Management Systems • To interface a database with front end tools To understand the internals of a database system				
Experiments	• Basic SQL • Intermediate SQL • Advanced SQL • ER Modeling • Database Design and Normalization • Accessing Databases from Programs using JDBC • Building Web Applications using PHP & MySQL • Indexing and Query Processing • Query Evaluation Plans • Concurrency and Transactions • Big Data Analytics using Hadoop				
Outcomes	• Ability to use databases for building web applications. • Gaining knowledge about the internals of a database system.				
References	1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th edition, Tata McGraw Hill, 2011 2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4th Edition, Pearson/Addision wesley, 2007				

BCA 278	Programming Essentials in Python	L	T	P	C
Version1.1		3	0	0	3
Pre-requisites//Exposure	Any Programming Language				
co-requisites					

Course Objectives

The objective of this course is to:

1. Learn core programming basics—including data types, control structures, algorithm development, and program design with functions.
2. Learn the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques.
3. Solve problems, explore real-world software development challenges, and create practical and contemporary applications.

Course Outcomes

At the end of this course students will be able to:

1. Gain knowledge of Programming with Python
2. Design and develop a webpage and web sites for need of an organization
3. Use object oriented programming techniques
4. Familiarize with python with string handling techniques
5. Understanding testing and debugging
6. Understanding various algorithms of searching and sorting algorithms and various IDE's in Python.

Catalog Description

This course introduces the student to the Python language. Upon completion of this class, the student will be able to write non trivial Python programs dealing with a wide variety of subject matter domains. Topics include language components, the IDLE environment, control flow constructs, strings, I/O, collections, classes, modules, and regular expressions. The course is supplemented with many hands on labs using either Linux or Windows.

Text Books

1. Budd T A, Exploring Python , 2011, Tata McGraw Hill Education, ISBN-10: 0071321225
2. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978-1111822705.

Reference Books

3. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/
4. Python Programming: An Introduction to Computer Science (Second Edition) John Zelle, ISBN 978-1-59028-241-0-9, Franklin, Beedle & Associates Inc., 2004.
5. Downey, Allen B., Think Python: How to Think Like a Computer Scientist. O'Reilly, 2012. Obtain free PDF at http://www.greenteapress.com/thinkpython/

Course Content

Unit I: Introduction

8 Lecture hours

History , Features , Working with IPython, IPython Notebook, Installing Python, basic syntax, interactive shell, editing, saving, and running a script.

The concept of data types; variables, assignments; immutable variables; numerical types; Arithmetic and Logical operators and Boolean expressions; short-circuit (lazy) evaluation Debugging, comments in the program; understanding error messages; Catching exceptions using try and except.

Conditional Statements : If, If-else, Nested if-else; Looping: For, While, Nested loops; Control Statements: Break, Continue, Pass;

Unit II: Function and Strings

7 Lecture hours

Functions in Python: Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

String manipulations: subscript operator, indexing, slicing a string; strings and number system: converting strings to numbers and vice versa.

Unit III: Lists, Tuples and Dictionaries

8 lecture hours

Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Unit IV : Files

7 lecture hours

Manipulating files and directories, os and sys modules; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab-separated).

Unit V : Concept of Object Oriented Programming

8 Lecture hours

Objects, Classes, Encapsulation, Inheritance, Polymorphism

BCA 258	**Python Programming Language LAB**	L	T	P	C
Version1.1		0	0	2	1
Pre-requisites//Exposure	Any Programming Language				
co-requisites					

OBJECTIVES:

- To write, test, and debug simple Python programs.
- To implement Python programs with conditionals and loops.
- Use functions for structuring Python programs.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python.

LIST OF PROGRAMS:

1. Compute the GCD of two numbers.
2. Find the square root of a number (Newton's method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

BCA 277	LINUX ADMINSTRATION	L	T	P	C
Version No. 1.0	Date of Approval: MAY 2016	3	0	0	3
Prerequisite	Operating system				
co-requisites	c- programming				
Course Coordinator	Ms. Apurva Sharma				

Course Objectives

The objective of this course is to:

1. Introduce the basic concepts of Linux Operating System.
2. Introduce the networking concept in Linux.
3. Introduce the Linux programming Techniques.
4. To understand File systems and File structures of Linux operating system.

Course Outcomes

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

1. Understand and implement basic system functionaltty of LINUX operating system.
2. Analyze and implementation of dual booting LINUX and Windows XP/VISTA.
3. Learn the basic set of commands and utilities in Linux operating systems.
4. Analyze and understand the LINUX FILE SYSTEM.
5. Understand and implement networking concept using LINUX Operating System.
6. Use and Implement shell scripts in order to perform basic shell programming.

Catalog Description

The purpose of this course is to provide a case study of operating System. The main goal of the course is to teach the students the OPEN SOURCE OPERATING SYSTEMS. The course is also to learn the interanl structure of Linux Operating system, file system and how it works. This also provides the basic knowledge of shell scripting.

Text Books

1. “Richard Petersen, The Complete Reference – Linux, McGraw-Hill.

2. LINUX kernel development by Robert Love.
3. Yashwant Kanetkar, UNIX & Shell programming – BPB.
4. Wale Soyinka, "Linux Administration: A Beginner's Guide", McGraw Hill Companies

Reference Books

1. M.G.Venkateshmurthy, Introduction to UNIX & Shell Programming, Pearson Education
2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", O'

Course Content

Unit I: History and Installation of Linux **7 lecture hours**

History,Hardware and Environmental Considerations, Server Design, , Methods of Installation, Installing Fedora, Installing Ubuntu Server.Dual-Booting Issues ,Comparison between UNIX and LINUX.

Unit II: Introduction to Linux: Basic Terminology **7 lecture hours**

Linux – The Operating System, Open Source Software, Features of Linux, GNU, GNU Public License, Advantages of Open Source Software, Difference between Windows and Linux.

Unit III: Linux Commands **10 lecture hours**

General-Purpose commands, File oriented commands, directory oriented commands, Communication-oriented commands, process oriented commands. Commands like: ls, cp, cat, mv , rm, chmod, ping, Who, who –b , who-m etc.
Security and system Integrity, Starting and Stopping the System, System Activity and Process Management, Users, Miscellaneous.

Overview of Networking – TCP/IP Administration, NFS and NIS Administration.

Unit IV: Boot Methods and Linux file system **7 lecture hours**

Boot Methods : The Boot Process, LILO, GRUB, Dual-Booting Linux and Windows XP/Vista, Boot-Time Kernel Options.
Introduction to Linux file system: Architecture, aspects/features of file system, different types of file systems.

Unit V: Shell Programming **9 lecture hours**

VI-editor, features of different shells, I/O in shell, control structures, loops, subprograms.
Shell scripts: Creating & executing shell scripts in Linux , shell variables , purpose of shell scripts.

Name of The Course	Linux Administration Lab	L	T	P	C
Course Code	BCA 257	0	0	2	1
Prerequisite					
Co requisite		IA	MTE	ETE	TOT
Anti- requisite		70		30	100

S.No	Title of the lab experiment
1	Study of any Open-source software
2	Process for installing ubuntu open source software
3	Study of general-purpose utilities commands.
4	Study of user & session management commands.
5	Study of file system navigation commands, text processing tools, communication commands.
6	Study of VI editor.
7	Study of Shell Script
8	Execute C & C++ programs in Linux.
9	Installation of Linux operating system. a. Partitioning drives b. Configuring boot loader (GRUB/LILO) c. Network configuration d. Setting time zones e. Creating password and user accounts f. Shutting down
10	Do the following changes in Grub file a. Write the path where the grub file is located. b. Change the timeout and title of the system.

11	Bash shell a.buit-in commands b.arithmetic expressions c.functions

BCA 279	**E-Commerce**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Version No.	2				
Prerequisite					
Objectives:	To provide students with a good understanding in planning, design, development, deployment and management of e-commerce systems and applications. The objective of the course is to make students familiar with fundamentals on electronic commerce technologies and to provide a sound knowledge of business models, information systems and technologies in relation to electronic commerce..				
Expected Outcome:	The students will be familiar with electronic commerce technology, business model and information systems.				
Module I	**Introduction**				
Infrastructure of Electronic Commerce – Networks – Packet Switched Networks – TCP/IP – Internet Protocol – Domain Name Services – Web Service Protocols – Internet Applications – Utility Programs – Markup Languages – Web Clients and Servers – Internets and Extranets – Virtual Private Network.					
Module II	**Core Technology**				
Electronic Commerce Models – Shopping Cart Technology – Data Mining – Intelligent Agents – Internet Marketing – XML and E-Commerce.					
Module III	**Electronic Payment System**				
Real World Payment Systems – Electronic Fund Transfer – Digital Payment – Internet Payment Systems – Micro Payments – Credit Card Transactions					
Module IV	**Security and Threats**				

Threats to Network Security – Public Key Cryptography – ` Network Security Solutions – Firewalls.		
Module V	**Inter/Intra Organizational Electronic Commerce**	
EDI – EDI Application in Business – Legal, Security and Privacy Issues – EDI and Electronic Commerce – Standards – Internal Information Systems –		
Reference Books		
Text Book		
Ravi Kalakota and Andrew B Whinston, Frontiers of Electronic Commerce, Add. Wesley, 2004.		
Reference Books		
1. Pete Loshin, Paul H Murphy, Electronic Commerce, II Edition, Jaico Publishers, 1996.		
2. David Whiteley, E-Commerce: Strategy, Technologies and Applications, McGraw Hill, 2000.		
3. Daniel Minoli & Emma Minoli – Web Commerce Technology – Tata McGraw Hill, 2002		

BCA 363	**Multimedia System**	L	T	P	C
		3	0	0	3
Prerequisite					
Objectives:	Student will get the Knowledge about the basics concepts of multimedia and its applications. Student will get the knowledge of its relevance with internet and its future aspects.				
Expected Outcome:	Student will gain fundamental knowledge about multimedia and its applications.				
Module I	**Introduction and Hardware & Software**				
Introduction : Multimedia - Definitions, Basic properties and medium types.(Temporal and non temporal) . Multimedia applications, Uses of Multimedia, Introduction to making multimedia - The Stages of project, the requirements to make good multimedia, Multimedia skills and training . Hardware and Software for Multimedia: Multimedia Hardware - Macintosh and Windows production Platforms, Hardware peripherals - Connections, Memory and storage devices, Media software - Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.					
Module II	**Building blocks Creating & Editing Media elements**				
Text, image, Sound, animation Analog/ digital video Data Compression: Introduction, Need, Difference of lossless/lossy compression techniques. Brief overview to different compression algorithms concern to text, audio, video and images etc.					
Module III	**Multimedia and the Internet**				
Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW - Web Servers, Web Browsers, Web page makers,and editors, Plug-Ins and Delivery Vehicles, HTML, Designing for the WWW -Working ,on the Web, Multimedia Applications - Media Communication, Media Consumption, Media Entertainment, Media games.					
Module IV	**Multimedia-looking towards Future**				

Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Virtual Reality, Digital Camera. Assembling and delivering a Multimedia project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM: The CD family, production,process, CD-i – Overview – Media Types Technology
Text Books
1. Tay Vaughan, "Multimedia: Making it work", TMH, 1999.
2. Ralf Steinmetz and Klara Naharstedt, "Multimedia: Computing, Communications Applications",Pearson, 2001.
Reference Books
1. Keyes, "Multimedia Handbook", TMH, 2000.
2. Steve Heath, "Multimedia & Communication Systems", Focal Press, UK, 1999.
3. K. Andleigh and K. Thakkar, "Multimedia System Design", PHI, PTR, 2000.

BCA 343	**Multimedia System LAB**	L	T	P	C
		0	0	2	1
	List of Program				
:	1. Write a program to justify a text entered by the user on both left and right hand side.forexample the test " An architect may have a graphics program to draw an entire building but be interested in only ground floor",can be justified in 30 columns.An architect may have a graphics programs draw an entire building but interested in ground floor. 2. Study the notes of a piano and stimulate them using the keyboard and store them in file 3. Write a program to read a paragraph and store it to a file name suggested by the author 4. Devise a routine to produce the animation effect of a square transforming to a triangle and then to a circle. 5. Write a program to show a bitmap image on your computer screen. 6. Create a web page for a clothing company which contains all the details of that company and at least five links to other web pages. 7. Write a program by which we can split mpeg video into smaller pieces for the purpose of sending it over the web or by small capacity floppy diskettes and then joining them at the destination. 8. Write a program to simulate the game of pool table 9. Write a program to simulate the game mine sweeper **10.** Write a program to play "wave" or "midi" format sound files				

BCA 366	NETWORK SECURITY	L	T	P	C
		3	0	0	3
Prerequisite					
Objectives:	Objective: This course deals with Network security. It is required for the protection of data against accidental or intentional destruction, disclosure or modification. Network security refers to the technological safeguards and managerial procedure which can ensure that organizational assets and individual privacy are protected over the network..				
Expected Outcome:	On completion of this course students will ***1.*** Describe the Network Security;. ***2.*** Understand different types of security threats; ***3.*** Discuss the Security Mechanisms; and ***4.*** List of Access Control.				
Module I	**FUNDAMENTALS**				
Attacks, Services, Mechanisms, Conventional Encryption, Classical and Modern Techniques, Encryption Algorithms, Confidentiality.					
Module II	**PUBLIC KEY ENCRYPTION**				
RSA, Elliptic Curve Cryptography, Number Theory Concepts.					
Module III	**MESSAGE AUTHENTICATION**				
Hash Functions, Digest Functions, Digital Signatures, Authentication Protocols.					
Module IV	**NETWORK SECURITY PRACTICE**				
Authentication, Applications, Electronic Mail Security, IP Security, Web Security.					
Module V	**SYSTEM SECURITY**				
Intruders, Viruses, Worms, Firewalls Design Principles, Trusted Systems.					
Text Book					

1. . Stallings, “Cryptography & Network Security, Principles & Practice”, 3rd Edition, Prentice Hall, 2002.

Reference Books

1. Bruce, Schneier, “Applied Cryptography”, 2nd Edition, Toha Wiley & Sons, 1996.
2. Man Young Rhee, “Internet Security”, Wiley, 2003.
3. Pfleeger & Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.

Name of The Course	**Network Security Lab**	**L**	**T**	**P**	**C**
Course Code	**BCA346**	**0**	**0**	**2**	**1**
Prerequisite					
Co requisite		**IA**	**MTE**	**ETE**	**TOT**
Anti- requisite		**70**		**30**	**100**

LIST OF EXPERIMENTS:

1. Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
2. Implement the following SUBSTITUTION TECHNIQUES
a) Caesar Cipher b) Playfair Cipher c) Hill Cipher
3. Implement the Rail fence – row & Column Transposition Techniques
4. Implement the DES Algorithm
5. Implement the RSA Algorithm
6. Implement the Diffiee-Hellman Algorithm
7. Implement the MD5 Algorithm e) SHA-1
8. Implement the Signature Scheme - Digital Signature Standard
9. Study and Implement Various IP Security Techniques
10. Study and Implement Various Web Security Techniques
11. Implement system firewall for network security
12. Study of system attacks and prevention methods
13. Various Network security evaluation research (Content Beyond the Sylabus)

BCA362	Advanced Computer Network	L	T	P	C
Version No. 1.2	Date of Approval: Dec XX, 2016	3	0	0	3
erequisite	Computer Network				
co-requisites	OS				
Course Coordinator	Dr Pallavi Goel				

Course Content

Unit I: Introduction **9 lecture hours**

Basic networking concepts revisited: introduction to networks, layering and link layer, network layer, routing, end-to-end layer, congestion control,

Module II: Modeling and measurement **9 lecture hours**

Modeling and measurement: network traffic modeling, network measurement, simulation issues, network coding techniques.

Module III: Routing and Design **10 lecture hours**

Routing and router design, scheduling and QoS, integrated and differentiated services, RSVP

Module IV: Wireless Networking **6 lecture hours**

Wireless networks and mobility supports, MAC protocol, routing, AODV, group communication, multicast, Flow and congestion control, TCP variants, TCP modeling, active queue management

Module V: Overlay Networks **10 Lectures Hours**

Overlay networks: RON, P2P, CDN, Web caching, cross-layer optimizations, Emerging network types: data center, DTN, 4G mobile networks (LTE, Wi-Max), Online social networks (OSN), wireless sensor networks (WSN) – cross-layer sensor data dissemination

Text Books

1. J.F. Kurose and K.W. Ross, Computer networking: A top-down approach, 6th edition, Adison Wesley.
2. L.L. Peterson and BS. Davie, Computer Networks ISE: A System Approach, 5th edition, Morgan Kaufman.

Reference Books

1. B.A. Forouzan, Data communication & networking, 5th Edition, Tata Mc-Graw Hills **Reference Books**

BCA361	Connecting Networks	L	T	P	C
Version No. 1.2		3	0	0	3

Module-1: Configuration and logging to a CISCO Router and introduction to the basic user Interfaces. Introduction to the basic router configuration and basic commands. Configuration of IP addressing for a given scenario for a given set of topologies.

Module-2: Configure a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address. Integrate the DHCP server with a BOOTP demon to automatically serve Windows and Linux OS Binaries based on client MAC address.

Module-3: Configure, implement and debug the following: Use open-source tools for debugging and diagnostics. a. ARP/RARP protocols b. RIP routing protocols c. BGP routing d. OSPF routing protocols e. Static routes (check using netstat) Configure DNS: Make a caching DNS client, and a DNS Proxy; implement reverse DNS and forward DNS, using TCP dump/Wireshark characterize traffic when the DNS server is up and when it is down.

Module-4: Configure FTP Server on a Linux/Windows machine using a FTP client/SFTP client characterize file transfer rate for a cluster of small files 100k each and a video file of 700mb.Use a TFTP client and repeat the experiment.

Module-5: Configure a mail server for IMAP/POP protocols and write a simple SMTP client in C/C++/Java client to send and receive mails , Implement Open NMS+ SNMPD for checking Device status of devices in community MIB of a Linux PC. Using yellow pages and NIS/NFS protocols implement Network Attached Storage Controller (NAS). Extend this to serve a windows client using SMB. Characterize the NAS traffic using Wireshark.