MAHATMA GANDHI UNIVERSITY
KOTTAYAM

BACHELOR OF DEGREE PROGRAMME IN COMPUTER SCIENCE

SCHEME & SYLLABUS
(Effective from 2009 Admissions onwards)

<u>**BACHELOR OF COMPUTER SCIENCE**</u>

1. About the Course

Technology is defined as the applications of Basic Science. The past two revolutions, industrial and electronic, have transformed the society from agricultural to industrial and then to electronic. The electronically based technologies focused in information gathering, processing and distribution. The use of this technology in all sectors gave the birth to Computer Industry and its unprecedented growth launched another revolution in Communication.

Information, the basic raw material for the Decision Support System, can be derived from processing of huge database related with different sectors. Systematic storage and management with adequate security are essential for data retrieval and processing to generate information. The information technology plays an important role in all areas. But the main drawback is the technophobia of the people to adapt with the new technologies. This may be due to lack of awareness of the merits and advantages of new technologies. So our youths have to be equipped with all kinds of knowledge tools to work with computers comfortably which are basic requirements to provide human resource to the industry.

The radical changes in technologies, both hardware as well as software, and their ever increasing adaptation to newer areas of application, demand frequent updation of the academic curriculum so that the students can rise to the expectation of the Industry. The syllabus revision committee has considered all these factors thoroughly before venturing into the revision exercise.

The revised syllabus for B Sc Computer Science Programme provides a strong foundation to pursue post graduation programme in computer science / applications. The knowledge acquired by the students may also equip them to meet the industrial need, and get placed.

The B Sc Computer Science programme of the MG University follows the choice based credit semester system as envisaged by the University Grants Commission and the Higher Education Council of Kerala. The Programme shall be completed in six semesters. Each semester is a minimum of 18 instructional weeks, comprising 90

working days with continuous internal evaluation and University examination at the end of each semester.

2. Course Objectives

The BSc Computer Science Programme is designed with the following specific objectives.
    (a)   To attract young minds to the potentially rich & employable field of computer Science.
    (b)   To be a foundation graduate programme which will act as a feeder course for higher studies in the area of Computer Science/Applications.
    (c)   To develop skills in software development and hardware maintenance so as to enable the graduates to take up self-employment in Indian & global market.
    (d)   To Train & Equip the students to meet the requirement of the Industrial standards.

3. Admission

The eligibility for admission to BSc Computer Science Degree under the Mahatma Gandhi University is a pass in Pre-degree, Plus Two or equivalent examinations in science stream with Mathematics/Computer Science as a compulsory subject.

4. Registration

All the candidates admitted for the course should register with the M.G University along with the original certificate of the qualifying examinations within 3 months from the date of commencement of the I semester course.

5. Duration of Course

The course shall normally extend over a period of three academic years consisting of six semesters.

6. Requirement of Attendance and Progress

A candidate shall normally be permitted to register and appear for the end semester university examinations if

(a) He/She secured not less than grade C for attendance in each course of study in the semester, and

(b) His/Her progress is satisfactory in the internal assessment in each of the subjects.

7. Examination System
  7.1. The evaluation of each course shall contain two parts
                    (i) Internal or In-Semester Assessment(ISA)
                    (ii) External or End-Semester Assessment(ESA)
               The internal: external examinations ratio shall be 1:3

7.2. . The Internal and External examinations shall be evaluated using Direct Grading system based on 5-point scale as given below.

Letter Grade	Performance	Grade point(G)	Grade Range
A	Excellent	4	3.5 to 4.00
B	Very Good	3	2.5 to 3.49
C	Good	2	1.5 to 2.49
D	Average	1	0.5 to 1.49
E	Poor	0	0.00 to 0.49

7.3. The overall grade for a programme for certification shall be based on CGPA with a 7-point scale given below.

CGPA	Grade
3.80 to 4.00	A+
3.50 to 3.79	A
3.00 to 3.49	B+
2.50 to 2.99	B
2.00 to 2.49	C+
1.50 to 1.99	C
1.00 to 1.49	D

A separate minimum of D Grade for internal and external are required for a pass for a course. For a pass in a programme a separate minimum of Grade D is required for all the courses. and must score a minimum CGPA of 2.00 or an overall grade of C+ and above

7.4. Internal evaluation: is to be done by continuous assessments on the following components.

7.4.1. Components of the Internal evaluation and their weights are as below.

    (i) Theory

Component	Weight
Attendance	1
Assignment	1
Seminar	1
Two test papers	2

    (ii) Practical

Component	Weight
Attendance	1
Laboratory Involvement	1
Lab Test	1
Record	1

| Viva-voce | 1 |

Practical – External :

Components	Weights
Algorithm	5
Source Code	6
Output	6
Record	3
Viva-voce	5

(iii) Project   ****
(iv)On-the –Job training   ****
(v) Social service activity   ****
(vi) Co-curricular activity   ****

7.4..2. Attendance:.

%age of Attendance	Grade
>90%	A
Between 85 and 90	B
Between 80 and 85	C
Between 75 and 80	D
< 75	E

7.4.3 Assignments: Best two assignments are considered per course

7.4.4. Seminar/Viva : The student has to take a minimum of 1 seminar per course.

7.4.5. Class test. A minimum of 2 class tests are to be attended. The grades of best 2 test are to be taken'

7.4.6. The evaluation of all components are to be published and are to be acknowledged by the candidate. All documents of internal assessments are to be kept in the college for 2 years and shall be made available for verification by the university. The responsibility of evaluating the internal assessment is vested on the teacher(s) who teach the course.

In case a candidate fails to secure the minimum grade D in internal assessment, he/she may secure it by repeating the course altogether in a regular class or to take the course with a faculty member assigned by the Head of the Department. But such improvement in internal in the same paper cannot be attempted more than once.

The supplementary examinations will be conducted along with the next regular semester examinations.

8. PATTERN OF QUESTIONS

Questions shall be set to assess knowledge acquired, standard application of knowledge, application of knowledge in new situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper.

A question paper shall be a judicious mix of objective type, short answer type, short essay type /problem solving type and long essay type questions.

Weight: Different types of questions shall be given different weights to quantify their range as follows:

	Type of questions	Weight	Number of questions to be answered
1	A bunch of 4 objective type questions	1	4 bunches (no choice)
2	Short answer type questions	1	5 out of 8
3	Short essay/problem solving type questions	2	4 out of 6
4	Essay type questions	4	2 out of 3

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9. Requirement for the completion of Programme

A candidate has to complete the Programme within a period of five years after the registration.

c) A candidate who does not complete the concerned semester with the minimum attendance requirement prescribed will not be permitted to attend the next semester.

PROPOSED SCHEME FOR B Sc Computer Science PROGRAMME
REVISED CURRICULUM - 2009

I Semester

Course No.	Course	No. of hours per week Lect	No. of hours per week Lab.	Durn. of Exam in hours	Credits
BCS101	English-I (Common)	5	-	3	4

Course No.	Course	No. of hours per week Lect	No. of hours per week Lab.	Durn. of Exam in hours	Credits
BCS102	Mathematics I (Complementary)	4	-	3	4
BCS103	Basic Electronics and Computer Fundamentals (Core)	4	-	3	4
BCS104	Methodology of Programming and Programming in C (Core)	4	-	3	3
BCS105	Digital Electronics (Complementary)	4	-	3	4
BCS106	Software Lab – I (Core)	-	4	3	2
	Total	21	4		21

II Semester

Course No.	Course	No. of hours per week Lect	No. of hours per week Lab.	Durn. of Exam in hours	Credits
BCS201	English-II (Common)	5	-	3	4
BCS202	Mathematics II (Complementary)	4	-	3	4
BCS203	Data Structures (Core)	4	-	3	3
BCS204	Principles of Electrical Communications (Complementary)	4	-	3	4
BCS205	Object Oriented Programming in C++ (Core)	4	-	3	3
BCS206	Software Lab- II (Core)	-	4	3	2
	Total	21	4		20

III Semester

Course No.	Course	No. of hours per week Lect	No. of hours per week Lab.	Durn. of Exam in hours	Credits

BCS301	Probability and Statistics (Complementary)	4	-	3	4
BCS302	System Software (Core)	4	-	3	4
BCS303	Database Management Systems (Core)	4	-	3	3
BCS304	Data communication (Core)	4	-	3	4
BCS305	Computer Organisation (Core)	4	-	3	4
BCS306	Software Lab–III (Oracle) (Core)	-	5	3	2
	Total	20	5		21

IV Semester

Course No.	Course	No. of hours per week		Durn of Exam in hours	Credits
		Lect	Lab.		
BCS401	Visual Programming (Core)	4	-	3	4
BCS402	Microprocessor & Assembly Language Programming (Core)	4	-	3	4
BCS403	Computer Network & Internet (Core)	4	-	3	4
BCS404	Operating System (Core)	4	-	3	4
BCS405	AssemblyLanguage Programming (Core)	-	5	3	2
BCS406	Software Lab–IV (VB) (Core)	-	4	3	2
	Total	16	9		20

V Semester

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab.		
BCS501	Computer Aided Optimisation Techniques (core)	4	-	3	4
BCS502	System Analysis & Design(core)	4	-	3	4
BCS503	Java Programming(core)	4	-	3	3
BCS504	Linux and PHP (core)	4	-	3	3
BCS505	Open Course (core)	4	-	3	4
BCS506	Linux programming and project in java(core)	-	5	3	2
	Total	20	5		20

VI Semester

Course No.	Course	No. of hours per week		Durn. of Exam in hours	Credits
		Lect	Lab.		
BCS601	Parallel Processing(core)	5	-	3	4
BCS602	Computer Graphics and Multimedia(core)	5	-	3	4
BCS603	Elective (core)	5	-	3	4
BCS604	Seminar	-	3	3	2
BCS605	Project (core)		7	-	3
BCS606	Viva-voce	-	-	-	1
	Total	15	10		18

Elective:
BCS603(A): Data Mining
BCS603(B): Client Server Computing

BCS603(C): Image processing
BCS603(D) : Bio-informatics

OPEN COURSE: INTERNET, WEBDESIGNING & CYBER LAWS
(For students of other departments)

<u>**SEMESTER 1**</u>
BCS101   English 1 (Common)
Course Title: COMMUNICATION SKILLS IN ENGLISH
   MODULE – I

   Speech Sounds   **18 hours**

   Phonemic symbols - Vowels - Consonants - Syllables - Word stress - Stress in
   polysyllabic words – Stress in words used as different parts of speech -   Sentence
   stress – Weak forms and strong forms – Intonation – Awareness of different
   accents: American, British and Indian – Influence of the mother tongue
   MODULE – II

   Listening   **18 hours**

   Active listening – Barriers to listening – Listening and note taking– Listening to
   announcements – Listening to news on the radio and television

   MODULE- III

   Speaking   **36 hours**

   Word stress and rhythm – Pauses and sense groups – Falling and rising tones –
       Fluency and pace of delivery – Art of small talk – Participating in
       conversations – Making a short formal speech – Describing people, place,
       events and things – Group discussion skills and telephone skills

   MODULE – IV

   Reading   **18 hours**

   Reading: theory and Practice – Scanning - Surveying a textbook using an index -
   reading with a purpose – making predictions – Understanding text structure –
   Locating main points – Making inferences - Reading graphics - reading critically
   – Reading for research

4.   CORE TEXT

   V.Sasikumar, P Kiranmai Dutt and Geetha Rajeevan, . *Communication Skills in
   English*. Cambridge University Press and Mahatma Gandhi University.

FURTHER READING

Sl.No	Title	Author	Publisher & Year
1	*A Course in Listening and Speaking I & II*	Sasikumar V.,Kiranmai Dutt and Geetha Rajeevan	New Delhi: CUP, 2007
2	*Study Listening: A Course in Listening to Lectures and Note-taking*	Tony Lynch	New Delhi: CUP, 2008
3	*Study Speaking: A Course in Spoken English for Academic Purposes*	Anderson, Kenneth, Joan Maclean and Tony Lynch	New Delhi: CUP, 2008
4	*Study Reading: A Course in Reading Skills for Academic Purposes*	Glendinning, Eric H. and Beverly Holmstrom	New Delhi: CUP, 2008
5	*Communication Studies*	Sky Massan	Palgrave Macmillan
6	*Effective Communication for Arts and Humanities Students*	Joan Van Emden and Lucinda Becker	Palgrave Macmillan

BCS102   Mathematics 1 (Complementary)

MEC1C01: Vector Analysis, Differential Equation, Fourier series and Integral Transform

Module I   **(25 Hours)**
Vector Analysis:
A quick Review of the basic concepts (Sections 8.4, 8.5, 8.6 of text 1),

Gradient of a scalar field; Directional Derivative, Divergence of a vector field, Curl of a

Vector Field.   (Sections 8.9, 8.10, 8.11 of Text 1).

A quick Review of Line Integrals, Surface Integrals, and Triple Integrals, (sections 9.1

and 9.6 of text 1)

Green's Theorem in the Plane, Divergence theorem of Gauss and Stoke's theorem

(without proofs).

(Sections 9.4, 9.7, 9.9, of Text 1)

Co-ordinate System:

Cartesian, Spherical and Cylindrical co-ordinate systems and transformations. Forms of

the Gradient, Divergence, Curl and Laplace an operators in the co-ordinate systems

(As in Text 2)

Module II   **(22 hours)**
Ordinary Differential Equations:
Exact differential equations, homogenous, non-homogeneous, linear and Bernoulli's

equations. Linear Differential equation of second order with constant coefficients.

Simultaneous equations with constant coefficients

Partial Differential Equations:
Laplace's equation, Poisson equation and wave equation.
(Relevant sections of Text 2)
Module III   **(15 Hours)**
Fourier Series:
Periodic functions, trigonometric series, Fourier series , Functions of any period, Even
and odd functions, Half range expansions,
(Sections 10.1, 10.2, 10.3, 10.4, Text 1)
Module IV   **(10 Hours)**
Integral Transform:
Laplace Transform, inverse Laplace Transform, Linearity, shifting, Transforms of
derivatives and integrals Solution of differential equations by Laplace Transform
(Sections 5.1 and 5.2 of text 1)

References:
1. George B. Thomas and Ross L. Finney - Calculus and Analytical Geometry
   (9th Edition) – Addison wesley

2. A.H. siddiqi, P. Manchanda - A First Course in Differential Equations with

   Application

                                                   (Macmillian)
3. G. F. Simmons - Differential equation with applications and historical notes

   (Tata Mc Graw Hill)

4. Ian Sneddon - Elements of Partial Differential Equation – Ian Sneddon

   (Tata Mc Graw Hill)

BCS103 :   Basic Electronics and Computer Fundamentals (Core)

Module I (12 hrs)
Introduction : Concepts of charge, potential, voltage, current, power and their units.
Introduction to semiconductors: Conductors, Insulators, Intrinsic and Extrinsic semiconductors, Dopping- PN junction
Electronic devices: Diodes- different types- Schematic symbols-Zenor diodes-LEDs- Bipolar transistors, FET, MOSFET, CMOS

Module 2 (14 hrs)
Rectifiers: Half wave, full wave, Bridge rectifiers-Filters-simple filter circuits-Concepts of regulators
Amplifiers: Concepts of amplification- RC coupled amplifier circuit- concepts of gain and bandwidth- Frequency response
Regulated power supply- Basic concepts of DC Regulated power supply-block diagram, concepts of regulation and ripple factor- Concepts of Switch Mode Power Supply-block diagram, Invertors and UPS and their applications

Module 3 (7 hrs)
Introduction –Generation of computers- Types of computers - Desktop, Mainframe & Super Computers Basic components of a digital computer-block diagram –Booting process-POST-BIOS
CPU: Basic components of CPU- clock speed

Module 4 (15 hrs)
Memory: Primary memory-Types of memory-RAM & ROM- Static and Dynamic-ROM,PROM, EPROM,EEPROM, Flash memory, CMOS memory-PC memory modules-DIP, SIMM, DIMM , DDR, RDRAM,DDR2, memory speed. Secondary memory: Hard disks, CD ROM, CD-R, CD-RW, DVD-R, DVD-RW, Zip disk, concepts of latest storage devices- Blu-ray disk, HVD etc.

Module 5 (15 hrs)
Basic I/O devices: Keyboard, Light pen, Mouse, Joystick, Trackballs, Web cams
Scanners: Optical scanners-Magnetic Ink Character reader
CRT and-Non-CRT displays- LED, LCD, Plasma, TFT
Printers-Types of printers- Character, Line and page printers-Working of Impact and non-impact printers
Expansion slots-ISA, EISA, MCA,VESA,PCI local bus

Text Books
Basic Electronics and Linear Circuit By N N Bhargava, DC Kulshreshtha and Sc Gupta
Computer Fundamentals Architecture and Organization by B RAM
References
Basic Electronics Solid State By BL Thereja
Fundamentals of computers By V Rajaraman
How Computers work By Ron White
Bigelow's PC Troubleshooting & Repair – Stephen J Bigelow- Dreamtech Press

BCS104 : Methodology of Programming and Programming in C (Core)
Module 1 (10 hrs)
Program Concept, Characteristics of Programming, Various stages in Program Development Programming aids Algorithms, Flow Charts - Symbols, Rules for making Flow chart, Programming Techniques – Top down, Bottom up, Modular, Structured - Features, Merits, Demerits, and their Comparative study. Programming Logic- Simple, Branching, Looping, Recursion, Cohesion & Coupling, Programming Testing & Debugging & their Tools .

Module 2 (10 hrs)

C language basics: C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, qualifiers – long, short and unsigned declarations, expressions, symbolic constants, input/output functions, compound statements, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.h
Module 3(16 hrs)
Control flow: If statement, if….else statement, nested if ..else statement, switch statements, looping – for loop , while loop, do … while statements, nested loop structure, break, continue and go to statements.
Arrays & Strings: Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays, Array of Characters, Character arrays and strings, String handling Functions.

Module 4 (18 hrs)

User Defined Functions: Function declaration, definition & scope, recursion, Arrays and functions, call by value, call by reference, Storage Classes: automatic, external (global), static & registers.

Module 5 (20 hrs)

Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures, unions, typedef statements.
Pointers: Pointer Definition, pointer arithmetic, array & pointer relationship, pointer to array, pointer to structure, dynamic memory allocation.

Book of study:
  Programming in ANSI C 4E , E. BalaGuruswamy, TMH
  Programming in C, Byron S Gottfried, Shaum's Outline series. TMH
References:
Computer Fundamentals By P K Sinha & Priti Sinha Fourth Edition.
B. Kernighan and D. Ritchie, "The ANSI C Programming Language", PH

BCS105 : Digital Electronics (Complementary)

Module 1 (8 hrs)
Number systems, Operations and Codes :- Decimal numbers – Binary Numbers – Decimal to binary conversion – Binary arithmetic – 1's and 2's complement of binary numbers – Signed numbers – Arithmetic operations with signed numbers – hexadecimal numbers – octal numbers – binary coded decimal – digital codes – error detection and correction codes.
Logic gates :- The inverter – AND – OR – NAND – NOR – Exclusive OR – Exclusive NOR Gates.

Module 2 (10 hrs)
Boolean algebra and logic simplification: - Laws and rules of Boolean algebra – De-Morgan's theorems – simplification of logic expressions using Boolean algebra – SOP and POS expressions – the Karnaugh map – Karnaugh map minimizations.
Combinational Logic :- Implementation of a logic circuit from a Boolean expression – Implementation of a logic circuit from a truth table – Minimizing a logic circuit – The Universal property of NAND and NOR gates

Module 3 (12 hrs)
Logic Functions :- Adders – Parallel Binary Adders – Comparators – Decoders – Encoders – Code Converters – Multiplexers – De-multiplexers – Parity Generators/Checkers.

Module 4 (20 hrs)
Flip Flops:- Latches – Edge triggered flip flops – Master-Slave Flip Flops -- Flip-Flop Operating Characteristics – Flip-Flop Applications. Counters :- Asynchronous Counter Operation – Synchronous Counter Operation – Up/Down Synchronous Counters – Design of Synchronous Counters – Cascaded Counters – Counter Decoding – Counter Applications.

Module 5 (14 hrs)
Shift Registers:- Serial In/Serial Out Shift Registers – Serial In/Parallel Out Shift Registers – Parallel In/Serial Out Shift Registers – Parallel In/Parallel Out Registers – Bidirectional Shift Registers – Shift Register Counters – Shift Register Applications - System Interfacing-ADC-DAC.

Book of study:

Digital Fundamentals – Eighth edition – Floyd and Jain – Pearson education
References
Digital logic and computer design – Morris Mano PHL
Digital computer fundamentals - Bartee T

 BCS106   Software Lab I (Core)

[*There will be two questions: the first from Exercises 3 to 5 and the second from Exercises 6 to 10. Exercises 1 and 2 will be included in the viva*]

1. Familiarization of Computer System and installation: Demonstration of various units of Computer system, handling of devices, demo on hardware units, Login process, Booting Process, software installation, driver installation, printer installation etc.

2. Practicing Operating System Commands: MS-DOS internal & External commands (dir, copy, del, ren, copy con, date, time, chkdsk, mkdir, cd, rmdir, EDIT etc). MS-WINDOWS –using start menu, desk top, task bar, word pad, note pad, file management-creation, copy, delete, moving of files in directories, selecting and executing a program - Demonstration of editing, compiling and executing a C program using a C compiler.

3. **Programs using Basic Constructs**: Fundamental data types, qualifiers- long, short, unsigned, input/output functions – scanf(), printf(), Arithmetic expressions, Evaluation of integer, real and mixed mode arithmetic expressions, truncation effect, type casting, relational and logical expressions, Conditional operators, trigonometric functions- sin(), cos(), tan(), mathematical functions – abs(), sqrt(), round() defined in math.h, printing formatted   outputs   using   width   specifier.

4. Programs using control structures: if, switch, for, while, do…while, nested structures, break and continue. Sample programs should include printing of Fibonacci numbers, prime numbers, check for Armstrong numbers, summation series – exp(x), sin series etc and verification of result using built in functions, printing pyramid like pattern & other similar patterns using nested loops.

5. Programs using Arrays: Array based programs – Creation of array containing prime numbers, matrix addition, matrix multiplication, transpose of a matrix, array sorting, preparing rank lists based on marks, searching of arrays (linear) for finding price of an item.   Static   initialization   of   arrays.

6. **String manipulation programs** – reading strings using %s, gets(), getchar(), copying one string into another, counting number of characters, vowels, words etc, using string handling   functions.

7. User Defined Functions: Programs using return type functions, void type functions, example program using recursive functions, array sorting program using function with call   by   reference,   function   to   copy   one   string   into another.

8. Program using structures: array of structures, program using structure containing arrays and array of structures. Rank list preparation
9. Simple program using pointers

BCS201   ENGLISH II (Common)
             **Course Title: CRITICAL THINKING, ACADEMIC WRITING AND
                              PRESENTATION**

   MODULE – I

   Critical Thinking   **18 hours**

Introduction to critical thinking – Benefits - Barriers – Reasoning - Arguments - Deductive and inductive arguments – Fallacies - Inferential comprehension- Critical thinking in academic writing - Clarity - Accuracy – Precision - Relevance
         MODULE – II

Research for Academic Writing and the Writing Process   **18 hours**

Data collection - Use of print, electronic sources and digital sources - Selecting key points - Note making, paraphrasing, summary – Documentation - Plagiarism – Title – Body paragraphs - Introduction and conclusion – Revising - Proof-reading

     MODULE – III

Accuracy in Academic Writing   **18 hours**

Articles - Nouns and prepositions - Subject-verb agreement - Phrasal verbs - Modals - Tenses - Conditionals – Prefixes and suffixes – Prepositions - Adverbs – Relative pronouns - Passives - Conjunctions - Embedded questions - Punctuation – Abbreviations

     MODULE – IV

Writing Models   **18 hours**

Letters - Letters to the editor - Resume and covering letters - e-mail - Seminar papers - Project reports - Notices - Filling application forms - Minutes, agenda - Essays

MODULE – V

Presentation Skills 18 hours

Soft skills for academic presentations - Effective communication skills – Structuring the presentation - Choosing appropriate medium – Flip charts – OHP - PowerPoint presentation – Clarity and brevity - Interaction and persuasion - Interview skills –Group Discussions

CORE TEXT

Marilyn Anderson, Pramod K Nayar and Madhucchandra Sen. *Critical Thinking, Academic Writing and Presentation Skills*. Pearson Education and Mahatma Gandhi University.

BCS202   MATHEMATICS II (Complementary)
MEC2C01 : LINEAR ALGEBRA AND GRAPH THEORY
Module I
Vector spaces: Definition and examples, Linear Independence basis, Orthonormal Basis, Linear transformation, Matrix via Linear Transformation

Module II

Symmetric, Skew symmetric, Hermitian and Skew Hermitian matrices, Adjoint and Inverse of a matrix, Orthogonal and Unitary matrices, Rank of a matrix, Elementary transformations of a matrix, reduction to normal and echelon form.

Module III

Consistency and solution of System of linear equations, characteristic equation of a matrix, Eigen values, Eigen vectors, Cayley Hamilton theorems, Nature of Characteristic roots of diagonal, Hermitian, Skew –Hermitian and unitary matrices.

Module IV
Graph theory terminology, Paths and Circuits, Representation of Graphs, Path Matrix, Adjacency matrix, Adjacency matrix.
Exterior paths and circuits, Hamiltonian paths and Circuits, Spanning tress, Minimum spanning trees.

Reference Books:
1. I. N. Herstain – Topics in Algebra

2. Narsingh Deo – Graph Theory with Applications to Engineering and Computer Science

3. Santi Narayan - Matrices

BCS203 : Data Structures (Core)

Module 1 (8 hrs)
Programming Concepts: Introduction , Basic Terminology, Data Structure Operations;
Algorithm: Definition, Algorithm Analysis, Complexity, Asymptotic Notation,
Recursion.

Module 2 (10 hrs)
Array: Introduction, Linear Arrays, Representation of Linear Arrays in Memory,
traversing Linear Arrays, Insertion and Deletion in Linear Arrays; Multidimensional
Arrays; Matrices, Sparse Matrices.**String**: Basic Terminology, Representation, String
Operations, Pattern Matching Algorithms.

Module 3 (12 hrs)
Stack: Introduction, Array Representation and Basic Operations; Implementation of
Stacks. Application of Stacks-Evaluating Arithmetic Expression using Stacks -Infix to
Postfix Notation.-Evaluating a Postfix Notation- **Queue**: Introduction, Implementation of
Queue, Priority Queue, Dequeue

Module 4 (14 hrs)
Linked List: Introduction, Representation of Linked List, Traversing, Searching a list,
Insertion and Deletion in a Linked List; Header Linked List, Doubly and Circular Linked
List; Garbage Collection.

Module 5 (12 hrs)
Non Linear Data Structures and Algorithms
Trees : Introduction, Binary Trees, Representation, Traversing and its Algorithms,
Threaded Trees, Binary Search Trees; Heap Trees, Huffman's Algorithm, Application of
Trees.

Module 6 (8 hrs)
Sorting: Bubble sort, Insertion sort, Selection sort, Heap sort, Quick sort, Merge sort;
Comparison of sorting algorithms. **Searching:** Linear Search, Binary Search;
Comparison of searching algorithms.

Book of study :
Schaum's Outline Series: Theory and Problems of Data Structures-Seymour Lipschutz
References
Introduction to data structures with application-Jean-Paul Tremblay & G.Sorenson
Data structures using c and C++ , Tanenbaum

BCS204 : Principles of Electrical Communication (Complementary)

Module 1 (6 hrs)
Signals: - Introduction To Signals- Analog And Digital- Periodic And A Periodic. Different Types - Graphical Representation. Frequency Spectrum -Bandwidth- Simple Communication Model. Communication Blocks.

Module 2 (10 hrs)
Media: Different Types- Guided And Unguided-Physical Description And Characteristics Of Twisted Pair Cables, Coaxial Cables And OFCs- Introduction To Signal Noise - Transmission Impairments- Channel Capacity- SNR- Wireless Transmission-Satellite Communication- IR Transmission.

Module 3 (22 hrs)
Modulation and Demodulation: - Modulation- Introduction AM, FM, PM- DSB, SSB. Vestigial Sideband Modulation-Analysis Of AM, FM, PM Waves- Generation of AM Waves, Filter System- Phase Shift Method- Third Method- Generation Of FM- FM Methods- Direct Method- AFC- Indirect Method. Demodulators- AM And FM- AM Receivers- FM Receivers- Comparison Of AM And FM.

Module 4 (16 hrs)
Digital Communication: - Introduction- Sampling- Quantization- Companding- Nyquist Criteria- Pulse Modulation- Digital Communications: - PCM, DPCM, DM, ADM, Concept Of FDM And TDM.

Module 5 (10 hrs)
Digital Modulation Techniques: - ASK, FSK, PSK, BPSK,QPSK, BFSK.

Book of study:

Electronic Communication Systems   , Kennedy And Davis
Principles of Communication Systems , Taub And Schilling

References:

Data & Computer Communications   ,William Stallings
Data Communication And Networking , Behrouz A Forouzan

BCS205 : Object Oriented Programming in C++ (Core)

Module 1(16 hrs)
Introduction to object oriented concepts, features of object oriented programming, C++ programming basics, Data types, operators, precedence of operators, control flow, functions, arrays and strings, operations on arrays, string manipulations.
Classes and objects, constructors, destructors, objects as function arguments, inline functions, friend functions, friend classes, array of objects.

Module 2(10 hrs)
Overloading, operator overloading, overloading unary operators, overloading binary operators, function overloading, data conversion

Module 3(10 hrs)
Inheritance, Base class and derived class , forms of inheritance, public inheritance, private inheritance, constructors in derived class.

Module 4(14 hrs)
Virtual functions, pointers, memory management, new and delete, pointers within a class, pointers to objects, array of pointers to objects, pointer to object members, pointer to derived class objects, pointers to pointers, polymorphism, virtual function, pure virtual function, abstract classes , late binding,
early binding, the this pointer

Module 5(14 hrs)
Files and streams, streams, predefined console streams, string I/O, object I/O, files, file modes, file pointers, file input/output
command line arguments, templates, exception handling.

Book of study
E.Balaguruswamy, *Object Oriented Programming in C++*

References
1. Schaums Outline series, *Programming in C++*
2. Venugopal, Rajkumar, Ravishankar, *Mastering C++*, Mc Graw Hill
3. Stroustrup, Bjarne, *The C++ Programming Language* , Addison Wesley
4. Robert Lafore, *Object Oriented Programming in C++*, McGraw Hill

BCS206:   SoftwareLab II (C++) (Core)

Simple Programs using OOP concepts	8 hrs.
Inline and friend functions	6 hrs
Constructors and destructors	6 hrs
Array of objects	6 hrs
Over loading	6 hrs
Inheritance	6 hrs
Pointers and memory management	8 hrs

Virtual functions	6 hrs
Files Command line arguments	6 hrs
Templates and Exception handling	6 hrs

	Total	64 hrs

SEMESTER 3

BCS301 :   Probability and statistics (Complementary)

Module 1-

Introduction to Statistics, Basic concepts, population and sample, Collection of data, census and sampling .Methods of sampling-Random and Non Random sampling methods.
Frequency distributions-Measures of central tendency, measures of dispersion, moments,skewness and kurtosis.
Correlation and Regression analysis-Types of correlations, Methods of studyng simple correlation, properties of correlation coefficient.

Module-2-

Different approaches to probability, conditional probability, Independence of events, Addition and multiplication theorems, Bayes theorem,simple problems.
Random variables and probability distributions-discrete and continuous.-distribution function and its properties. Extension to bivariate case [elementary concept only]

Module 3-

Expectation and its properties., Mean variance and moments in terms of expectation. Moment generating function and characteristic function- simple problems. Standard probability distributions-Binomial,Poisson,Uniform and Normal [mean variance and MGF]–problems relating to practical applications.

Module-4

Central Limit theorem[without proof] and its applications, Sampling distributions –Definition, parameter, statistic, Standard error[concept only], sampling distribution of the sample mean, t,X2 and F statistic definition and properties[with out proof]
Estimation –Concept of Point and Interval estimation –Point estimate and its properties.
Test of significance-Elementary ideas and simple problems.

Core reference

1-SC Gupta and VK Kapoor-Fundamentals of mathematical statistics-Sultan Chand and Sons.
2-Probability and statistics –Schaums outline series.

Additional References

1-Hogg R.V.Craig A.L. Introduction to mathematical statistics. American publishing Co Pvt Ltd.
2-Yulg U.G. Kendoll M.G.An Introduction to theory of statistics, Chailes Griffin & Co Ltd
3-Draper N.A.,Smith H Applied Regression Analysis,John Wiley & sons
4-William Mendenhall ,Robert J Beaver,Barbara M Beaver, Introduction to probability and statistics,Thomson 2007.

BCS302 :   SYSTEM SOFTWARE (Core)

Module 1 (8 Hrs)
 System software- General concepts, Assemblers- Design of assembler, Macros and Macroprocessor, Macro definitions& Instructions, Features of macro facility, Nested macros calls.

Module 2 (8 Hrs)
 Loading, Linking & Relocating- Loading& Linking Schemes- Relocatablity of Programs, Concepts of Binders, Linking Loaders, Overlays, Dynamic Binders, Design of an absolute loader.

Module 3 (16 Hrs)
 Phase of compiler, Aspects of Compilation- Data types, Data Structure, Scope rules, Control structure, Compilation Process- Analysis phase, Synthesis phase, Programming language grammars –Derivations, Reduction and system trees.

Module 4 (16 Hrs)
Classification of grammars, Ambiguity in program specification, Lexical Scanner, Parsing-Top down, Bottom up, Table driven parsing.

Module 5 (16 hrs)
 Compilation of expressions, Intermediate code forms for expressions, Compilation of control structures, Code optimization- Local and Global.

Book of study:
 System Programming & Operating systems- D M Dhamdhere (Tata McGraw Hill)

References:
System Programming - John J Donovan (Tata McGraw Hill)
Design of Compilers – Aho & Ullman

BCS303: Database Management Systems (Core)

Module 1 (10 hrs)

Introduction: Characteristics of the Database approach – Problems with file system data management– Data models, Schemas and instances – DBMS architectures- Data independences – Database languages and Interfaces – DDL – DML, DCL – Database Administrator—Duties.

Entity – Relationship model -Entity sets, attributes and keys- Relationships, Relationship types and structural constraints –Weak and strong entity- Enhanced Entity Relationship (EER) and object modeling.- specialization and generalization.

Module 2 (16 hrs)

Physical Data organization- Hashed files- Indexed files- B- Trees, sequential Organization files.
The relational Data model concepts-Relational model constraints- The Relational algebra- Tuple relational calculus, Domain relational calculus- SQL

Module 3 (10 hrs)
Database design- Functional dependencies- Basic definitions- Trivial and non trivial dependencies- Closure of a set of dependencies-closure of a set of attributes - Irreducible set of dependencies- Non loss decomposition and functional dependencies First, Second and Third Normal forms- Boyce –Codd Normal forms.

Module 4 (13 hrs)
Transaction processing- Desirable properties of transactions- Serializability of schedules Concurrency control techniques- Locking techniques- Time stamp Ordering and multi version techniques- Database recovery techniques- Recovery techniques based on deferred updates and immediate update, shadow paging-Database Security and Authorization-Access control based on granting/Revoking of privileges.

Module 5 (15 hrs)
Distributed databases- Centralized systems-Motivation of distributed databases-concepts-Types of distributed systems- Distributed Query processing-Commit protocols for distributed databases.
Introduction to Object oriented databases- Features-Object identity- Object containment-Inheritance-OODBMS and ORDBMS – Databases and Internet – Introduction to Data Mining and Data warehousing.

Book of study:
A. Silberschatz, H.F Korth , and S Sudarsan, "Database system concepts",4/e ,Tata McGraw Hill,2002

References
1)   Elmasri and Navathe, "Fundmentals of Database Systems", 3/e, Pearson Education, 2003
2)   Peter Rob, Carlos Coronel, "Database systems- Design Implementation and Management", Thomson 7/e.

3) C.J Date,"An Introduction To Database Systems", 7/e, Pearson Education, 2003
4) V K Jain "DBMS", Wiley Dream Tech India P Ltd N Delhi.
5) Bipin C. Desai."An Introduction to Database Systems", Galgotia Publications, 2001

BCS304 : Data Communications (Core)

Module 1(10 hrs)
Communication Devices :- Digital Data Transmission-DTE-DCE-Interface-Other Interface Standards-Modem- Different Types – Hub – Repeaters – Switches – Routers – Comparison – NIC - Multilayer Devices.

Module 2 (12 hrs)
Error Detection and Correction: - Errors – Types – Detection - Redundancy Check – Vertical – Horizontal – Cyclic – Checksum – Correction - Humming Code - Burst.
Wireless Devices and Wired Devices: - Cables for Communication - CAT 5 – UTP - BNC, Optic Transmission and Reception. Different Transmission Modes.

Module 3 (14 hrs)
Data Link Control - Line Discipline - ENQ/ACK - Poll/Select - Flow Control - Stop and Wait - Sliding Window - Error Control – ARQ - Different Types. Data Link Protocols - Asynchronous and Synchronous Protocols – Frames - Character Oriented - Bit Oriented – HDLC - Link Access Procedures.

Module 4 (15 hrs)
Switching – Packet – Circuit - Message. Approaches. Frame Relay: - Introduction-Layers - Congestion Control -Traffic Control - Other Features.

Module 5 (13 hrs)
Upper OSI Layers – Session - Session and Transport Interaction – Synchronization – SPDU – Presentation – Translation - Encryption and Decryptions – Authentication - Data Compression – Application – MHS – FTAM – VT – DS - CMIP

Book of study:

Data Communication and Networking By Behrouz A. Forouzan.

References:
Data & Computer Communications , William Stallings
Electronic Communication Systems , Kennedy and Davis
Principles of Communication Systems, Taub and Schilling

BCS305 :Computer Organisation (Core)
Module1(12 hrs)
Functional units, Basic operational concepts, Bus structures, numbers, arithmetic operations and characters, memory locations, and address, memory operations, instruction execution and straight line sequencing, branching, control codes, addressing modes
 As per chapter1of Book of study
Module 2(18hrs)
The memory system: basic concepts, semiconductor Ram memories, internal organization of memory chips, memory system considerations. ROM,PROM, EPROM, EEPROM, Flash memory, Speed, size and cost. Cache memories, performance considerations, interleaving

 As per chapter5of textbook

Module 3(14 hrs)
Arithmetic unit: addition and subtraction of signed numbers, addition/subtraction logic unit, design of fast adders, multiplication of positive numbers, signed operand multiplication, Booth algorithm. Fast multiplication, bit pair recording of multiplication, carry save addition of summands, integer division
 As per chapter6 of Book of study

Module 4(18 hrs)
Processing unit: Fundamental concepts, register transfers, performing an arithmetic or logic operations, fetching a word in memory, execution of a complete instruction, branch instruction, hardwired control, a complete processor, microprogrammed control.

 As per chapter7of Book of study

Module 5(10 hrs)
Input/Output organization: accessing I/O devices, Interrupts, enabling and disabling interrupts, handling multiple devices, Direct memory access, bus arbitration
 As per chapter4of textbook

Book of study:
Computer Organisation-Hamacher Vranesic Zaky (Fifth edition)
                    Mc Graw Hill

References
   1. Structured Computer Organisation-Andrew s Tannenbaum
   2. Computer Organisation and Architecture-William Stallings

 BCS306 : Software Lab III (RDBMS – ORACLE) (Core)

Basics: Connecting to RDBMS Server- user login – invoke SQL plus.

SQL plus: Naming a table- assigning storage data types- Display formats- creating tables- Creating tables from other tables- Creating Synonyms-Describing Table Structures-Commands – Changing table structures-Altering and dropping tables- Manipulating data in tables- Inserting data into tables –Using UPDATE to change data- DCL commands- GRANT, REVOKE, COMMIT, ROLLBACK-AUTOCOMMIT Deleting rows (**20 hours**)

Adding columns- saving and retrieving SQL commands- Editing SQL commands And SQL*plus commands (**8 hours**)

Query: Querying single tables- Projection, selection- Ordering, grouping results-accessing records from multiple tables-Subqueries-Correlated subqueries-Connecting Queries. (**14 hours**)

Views: Defining a view-granting view access to others-Querying views- creating synonyms-Defining multiple view with JOIN and without JOIN- Inserting, deleting and updating data through views- dropping views (**10 hours**)

PL/SQL: simple program using control structures-Cursors-Exceptions-Triggers-Procedures-Functions (**12 hours**)

Book of Study:
1) Understanding Oracle-James T perry & Joseph G Lateer
2) Sql, Pl/sql- Programming Language of Oracle -Ivan Bayross – 2nd revised edition 2002 -BPB   Publication.
3) Oracle a beginners guide- Michel Abbey & Michael J Corey
4) Oracle 9i –The complete reference- Loney & Koch – TMH Publication -2002

SEMESTER 4

BCS401: VISUAL PROGRAMMING (Core)

Module 1(6hrs)
 Introduction to Windows , GUI concept, Concept of Event–driven programming, The Visual Basic IDE(5.50) ,Types of Visual Basic Projects, Visual Basic Editions, The Visual Basic Project Lifecycle, Project Files.

Module 2(22hrs)
Programming Elements – Data types- Constants- Variables- operators – user defined data types-Library Functions- Program Comments- Arrays – Dynamic Arrays- Strings-Enumerations. Logic Statements – Conditional Constructs (if / Then, Select Case),Iteration (Do Loop, For Loop, DoEvents- Exit, Stop and End. Functions and Subroutines- Arguments – ByRef vs. ByVal Parameters- Optional Arguments- Module Basics-Event Procedures- Class Modules. Types of Errors,Error handling, Creating Error Handlers- Debugging –Debugging Tools.

Module 3(14hrs)
Forms- Controls, Control arrays, menus, menu editor, Graphics programming, Simple animation
SDI, MDI Applications
Database Concepts- Visual data manager ,The ADO Data Control-Data Grid Control – DBList and DBCombo Controls –Data view Window- Data form Wizard –Data Environment Designer.

Module 4 (10hrs)
Report using Crystal Reports, data environment – Reports using reports- Error handling – Creating Active X controls, Active EXE, Active X DLL.

Module 5(12hrs)
Introduction to the Web- Internet & Web Protocols- HTML, Structure of HTML documents, Attributes, Basic HTML Tags, Forms and Controls, VB Scripts, DHTML, DHTML object model,ASP,ASP object model.

Book of study :
1. Francesco Balena; Programming MS VB 6. 0, WP Publishers and Distributors (p) Ltd South Asian Edition.
2. Evangelos Petroutsos; Mastering Visual Basic 6, BPB Publishers First Editions, Reprinted 2005.
3. Deitel& Detiel, T. R. Nieto; VB 6 How to Program, Pearson Education.
4. Peter Norton; Guide to Visual Basic 6, Tech-Media.
5. Bob Reselman, Richard Peasley ; Using VB 6, PHI.

BCS402: Microprocessors and Assembly Language Programming
(Core)

Module 1 (10 hrs)
Microprocessor architecture and its operations – microprocessor initiated operations and 8085 bus organization, internal data operations, 8085 registers, externally initiated operations. Memory – memory map, memory and instructions, peripheral mapped I/O.
8085 microprocessor and its architecture.

Module 2 (16 hrs)
8086 Internal architecture. Basic 8086 microcomputer system – system overview, 8086 bus, Read machine cycle, Write machine cycle.
Assembly language programming – program development steps, 8086 instructions – data transfer instructions, arithmetic instructions, bit manipulation instructions, string instructions, program execution, Constructing the machine codes for 8086 instructions.
Implementing standard program in 8086 - unconditional jump instructions, condition flags, conditional jump instructions, If-then, If-then else, and multiple if-then-else , while-do , repeat-until , loop instructions, instruction timing and delay loops.

Module 3 (14 hrs)
Strings, Procedures and Macros – 8086 string instructions, writing and using procedures, CALL and RET instructions, stack, using PUSH and POP to save register contents, passing parameters, reentrant and recursive procedures, writing and using macros.

Module 4 (14 hrs)
8086 interrupts – program examples, interrupt Types, 8254 software – programmable TIMER/ COUNTER – basic 8253 and 8254 operations, 8255A, 8259A Priority interrupt controller.
Direct Memory Access data transfer – circuit connections and operations of the Intel 8257 DMA controller, DMA transfer timing diagram.

Module 5 (10 hrs)
Intel 80286 microprocessor – architecture, signals and system connections, Real address mode operation, protected mode operation. Intel 80386 32-bit microprocessor – architecture, pins and signals. Introduction to 80486 microprocessor. Introduction to RISC machines.

Book of study:
Microprocessors and Interfacing , Programming and Hardware, Douglas V- Hall. Tata McGraw-Hill.
Architecture, Programming and Interfacing - Barry B.Brey
Prentice – Hall India.

References:
Microprocessor 8086 programming & interfacing , A.nagoor Kani. RBA publications.
The Intel Microprocessors 8086 / 8088 , 80186 / 80188 , 80286 , 80386 , 80486 , Pentium, and Pentium Pro processor

BCS403: Computer Networking & Internet (Core)

Module 1 (12 hrs)

Overview – Networking terminology – network types- Transmission Media – Control Schemes – Layered Architecture – OSI Reference Model – TCP/IP Reference Model – Telephone Networks – Leased Lines – PSTN – ISDN – Broadband Communications – ISPs.

Module 2 (12 hrs)

Geographical Classifications of Network – Ethernet – LAN Interconnection Topologies- Fast Ethernets – VLANs – Protocols – Frame Relay – MAN – IP Addresses – Routing Algorithms – Internet Routing – IPv4/6 – NAT.

Module 3 (14 hrs)

TCP/IP – UDP – Wireless TCP – DNS – Electronic Mail – FTP – TFTP – SNMP etc.

Module 4 (12 hrs)

Wireless Networks – Blue Tooth – Cellular Radio Networks – Wireless LANs – Cable Television Networks – Satellite Television Networks – Interactive Services.

Module 5 (14 hrs)

Internet – Web Servers – Applications – URLs- WWW- HTTP & MIME – HTML & XML – Protocols – Languages – Scripts – RTSP – WAP – Securities – Basic Techniques – Data Encryption – Authentication – Network and Web Security – Privacy.

Book of study:

Computer Networking & Internet (Fred Halsall, Lingana Gauda Kulkarni).

References:

1. Computer Networks (Andrew S Tanenbaum)
2. Data and Computer Communications (William Stallings)
3. Data communication and Networking (Behrouz A Forouzan)

BCS404 : OPERATING SYSTEMS (Core)

Module 1(7 Hrs)
Definition- Functions- OS as Resource Manager, Types – Structure- Concept of Batch Processing, multi-programming, multi-user Systems and Real-time system, POST Bootstrapping – Kernel

Module 2(22Hrs)
Process management: process concept, process scheduling, operations on processes, cooperating processes, interprocess communication, communication in client server systems, threads, overview, multithreading models, CPU scheduling, scheduling criteria, CPU scheduling algorithms, process synchronization, critical-section problem-semaphores, deadlocks, prevention, avoidance and detection.

Module 3(16Hrs)
Storage Management: memory management, contiguous memory allocation, paging, segmentation, segmentation with paging, virtual memory, demand paging, page replacement, allocation of frames, thrashing.

Module 4(14Hrs)

File-System Interface: file concept, access methods, directory structure, file system structure, file system implementation, allocation methods, free space management, file protection and security- protection concepts, security problem, user authentication, program threats, system threats.

Module 5(5Hrs)
Device Management: types of devices-dedicated, shared- device scheduling & virtual devices- spooling, concept of device drivers.

Book of study:
1. Operating System Concepts – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne
(Addison Wesley)

Reference Books:
1. Operating System- Manick & Donovan(McGrawHill)
2. Operating system –H M Deitel (Pearson Education)
3. System programming & Operating Systems – D.M. Dhammdhere(Tata McGraw Hill)

BCS405 : Assembly Language Programming (8086 based) (Core)

(Minimum four programs from each section and 10 hrs per section.)

1. **Simple Arithmetic Calculations**
   2. **Conditional Statements**
   3. **Control Statements**
   4. **Loop and Arrays**
   5. **Character Strings**
   6. **Subroutines and Stack Operations**

BCS406 : Software Lab IV(Visual Basic) (Core)

Module 1 & Module 2 (20 hrs)

Module 3 (20 hrs)

Module 4 & Module 5 (24 hrs)

SEMESTER 5

BCS501: COMPUTER AIDED OPTIMIZATION TECHNIQUES

Module1(10 hrs)
Linear Programming: Mathematical formulation, Graphical methods of solution, general properties, Simplex method, Duality, dual simplex, post-optimality analysis.

Module 2(12 hrs)
Transportation and Assignment Problems: Transportation and transshipment problems, assignment problems, sample programs.

Module 3(14 hrs)
Network analysis, CPM and PERT: Shorter route problem, maximal flow problem, project scheduling, critical path calculations, PERT calculations, Sample programs.

Module 4(14 hrs)
Inventory models: Deterministic inventory models, infinite delivery rate with no back orders, infinite delivery rate with back orders, finite delivery rate with back orders. Introduction to probabilistic inventory models, sample programs.

Module 5(14 hrs)
Sequencing models: Processing of n jobs through m2 machines, n jobs through 3 machines, 2 jobs through m machines, maintenance crew scheduling.

Book of study:
Operations Research – Kanti Swarup, P.K. Gupta, Man Mohan (Sultan Chand & Sons)

References:

1. Operations Research: An Introduction – Hamdy A. Taha (Prentice Hall of India)
2. Introduction to Operations Research:Computer oriented Algorithmic(Mc Graw Hill 1976)
3. Quantitative Techniques in Management – Volma N.D (T.M.II 1990)
4. Operations Research for management – Shenoy G. VSrivastava& Sharma (Wiley Eastern II edition)

BCS502 : System Analysis And Design

Module 1 (10 hrs)
Information systems concepts, Business information systems; Describing the business organization – organization chart , organization function list ; information system levels - operational, lower, middle, top management; the system development life cycle concepts; hardware and software end products. **Life cycle activities**- life cycle flow chart, task, management review, baseline specifications, role of system analyst.

Module 2 (14 hrs)
Basic tool of system analysis: identification codes – definition, need for codes, code plan, code dictionary, common type of codes, forms design – basic parts of form, style and types of form, principles of form design .**Tools for structure analysis and design**: Types of basic charts, decision tables, decision trees, structured English, data flow diagram, data dictionary, system flow charts, flow charting symbols, information oriented flow charts, process oriented flow charts, HIPO charts.

Module 3 (12 hrs)
Study phase: Study phase activities, information service request, initial investigation, fact finding techniques, fact analysis techniques, steps in feasibility analysis, study phase report.

Module 4 (10 hrs)
Design phase: Design phase activities, structure design, input design- input data, input media and devices, output design, design phase report.

Module 5 (10 hrs)
Development phase: Development phase activities, bottom up and top down computer program development, training- programmer, operator, user trainings ; convertion; change over plan; PERT; steps in computer program development; structured programming; development phase report.

Module 6 (8 hrs)
Operation phase: Operation phase activities; change over crisis; change over activities; routine operations; security; performance evaluation.

Book of study :
Elements Of System Analysis – Marvin Gore & John Stubbe, Galgotia Book Source.

References:
System Analysis And Design – Elias M Awad , Galgotia Book Source.
Software Engineering Concepts – Richard Fairley , Tata Mc Graw Publication.

BCS503 : PROGRAMMING IN JAVA

Module I (12 Hours)

Brief History of Java , Feature of Java , JDK , Data Types , Operators ,Control Structures in JAVA , Arrays , The JAVA Class , Constructor , Finalizers , Classes inside Classes .

Module II (10 Hours)

Inheritance & Interface , Deriving Classes ,Method Overriding , Method Overloading , Access Modifiers , Abstract Class and Method , Interfaces , Packages.

Module III (12 Hrs)

Exception Handling , The Try-Catch Statement ,Catching more than one Exception , The Finally Clause , When to use Exceptions . Threads: Introduction , Creating Treads in Applications ,Methods in Thread Class .

Module IV (14 Hrs)

Java I/O Packages , Java Input Stream Classes , Java Output ,File Class .Graphic & Sound: AWT and Swing , Graphic Methods , Fonts , User interface components with Swing ,Loading and Viewing Images ,Loading and Playing Sound , AWT & Event Handling ,Layout.

Module V (16 Hours)

Networks & Layer of Networks , IP Address & Port Numbers ,URLs ,Client/Server Model, Socket Basics ,Server Socket ,Applets ,JDBC ,RMI .

Book of study:-

1. Ken Arnold, James Gosling; The Java Programming Language,

   Addison-Wesley Second Edition.

2. Joe Wigglesworth, Paula Lumby: Java Programming Advanced

   Topics, Thomson Learning

3. Deitel & Deitel; Java How to Program, Pearson Education

4. Elliotte Rusty Harold; Java Network Programming, 3RD Edition

5. Xavier C.; Programming with JAVA 2, SCITECH

 BCS504 : Linux and PHP

Module I (14Hrs)
                Overview of Linux, features, advantages, Booting process, kernel, simple commands-ls, cd, pwd, cp, mv, rm, rmdir, date-file permissions chmod- Editing files using vi editor, shell variables-shell types-filters—pr, head, tail, cut, paste, sort, grep, pipe, tee- Communication &Scheduling commands- mail, wall, write, talk, at, cron, crontab.
Module II (8Hrs)
                Shell Programming-control structures, operators, simple shell programs.

Module III (18Hrs)
                System Administration-creating and deleting users-mounting file systems-mount, umount-changing passwords-passwd-network administration –netstat, ping, ifconfig, traceroute-remote login-telnet, ssh, file transfer-ftp. process related commands-ps, kill- archiving- tar, gzip, Installation of packages using rpm command-Understanding various servers-DHCP,DNS, Apache, squid.

Module IV (14)

Introduction to PHP- Advantages –features-PHP syntax-variables-PHP tags and styles -data types, variables, operators-type casting- array operators-control structures-arrays-sorting arrays-file functions-string functions-functions in PHP

Module V (10 Hrs)

Object Oriented Concepts in PHP – classes, objects, inheritance, overloading and overriding – interfaces-exception handling techniques.

Book of study
1. Linux (Fedora)Bible , Christopher Negus, Wiley India Edition,2007
2. Linux Administration A beginners guide 2nd Edition.
3. Beginning PHP5, Apache, MYSQL, web development Wrox publication.

BCS505: OPEN COURSE

BCS505 – Internet, Web Designing and Cyber Laws

Unit I
Internet – Introduction, Basic Communication, Local Area Network, Packet Switching, Internet: A Network of Networks, ISPs and Network Connections, IP Address, Transaction Control Protocol (TCP), Domain Names.

Unit II
Internet Services: Electronic Mail, Bulletin Board Services (Network News), Browsing the World Wide Web, Automated Web Search (Search Engines), Audio and Video Communication, Faxes and Files (FTP), Remote Login.

Unit III
Facilities for Secure Communication, Electronic Commerce and Business.

Unit IV
Web Programming – Introduction to HTML, Creating Web Pages, Formatting Tags, Font, Lists, Table, Form, Marquee, Frame Tags, Creation of simple websites.

Unit V
Cyber Crimes- Computer Crime, Nature of Crimes, Penalty for damage to computer, Computer system, Tampering with Computer source documents, Hacking, Computer related offences, Theft, The Language of Cyber space.

Text Books
1. "The Internet", Douglas. E. Comer, Prentice hall of India – Third Edition
2. HTML Black Book

3. "Cyber Law Crimes", Barkhs and U. Rama Mohan, Asia Law House, New Edition

References
1. "Internet Complete Reference, Harley Hahn.

BCS 506 Linux Programming – Project in Java
Part A Linux Lab
1. Introduction to Linux – Booting ,login-simple commands (2 hrs)
2. Bash- wild card characters –grep-pipe-tee- command substitutions –Shell variables – subshells – export –filters – pr, head,tail ,cut,paste,sort,uniq,nl.grep,tr,join,-editors –vi and emacs-Communication and scheduling commands – mail ,talk,write,wall,at,cron –process related commands- ps,kill,nohup,nice,time – archieving –tar –gzip –rpm(8 hrs)
3. Shell programming –shell variables , read,echo,command line arguments && ,||,if, while case,for, until, test,set,shift , trape(8 hrs)
4. System administration – booting ,init,runlevels ,creating users and groups , system databases – password ,group ,shadow,init tab ,inetd.conf-startup scripts –shutdown – mount –fsck –network administration –net stat, ping , traceroute, ifconfig –telnet and ftp (6hrs)
5. X-windows systems –concepts ,window managers ,KDE and GNOME –setting up servers – DHCP –DNS –NFS-proxy- apache –samba (2hrs)

    Part B- Java Project (38 hrs)

SEMESTER VI

BCS601 :   Parallel Processing

Module 1(12 hrs)
Introduction to parallel processing: Parallelism in uniprocessor systems, parallel computer structures, Architectural classification schemes (Flynn's, Feng's and handler's), parallel processing applications.

Module 2(16 hrs)
Pipelining and vector processing: Linear pipelining, classification of pipeline processors, Instruction and arithmetic pipelines, principles of designing pipelined processors, characteristics of vector processing

Module3 (14hrs)
Structures and algorithms for Array processors: SIMD array processors, SIMD interconnection networks, parallel algorithms for array processors

Module4 (16 hrs)
Multiprocessor architecture and programming: functional structures of multiprocessor systems, interconnection networks, multiprocessor operating systems, interprocessor communication mechanisms

Module5(14 hrs)
Dataflow computers: Distinction between control flow and data flow computers, data flow graphs and languages, advantages and disadvantages of dataflow computers, dataflow computer architectures

Book of study
Computer Architecture and parallel processing-Kai Hwang and F A Briggs

References
1. Introduction to Computer Architecture-Stone H S(Galgotia publishers)
2. The Architecture of pipelined computers-Koggi H(Mc Graw Hill)

BCS602 : COMPUTER GRAPHICS AND MULTIMEDIA

Module 1(12 hrs)
Overview of Graphics System: display devices, raster scan systems, random scan systems, input devices, graphics software.
Output Primitives: points and lines, line drawing algorithms, DDA, Bresenhams line algorithm, circle generating algorithms, Bresenhams, Mid-point, Filled area primitives.

Module 2(18 hrs)
Attributes of Output Primitives: Line, Curve, Area fill, Character text, Marker Antialiasing. 2D Transformations: Basic transformations, Matrix representations and Homogeneous co-ordinates, Composite transformations, Reflection, Shear. 2D Viewing: viewing pipeline, window to viewport co-ordinate transformations, clipping operations, point, line-Cohen Sutherlands, polygon clipping-Hodgemans, Weilor-Atherton, curve, text.

Module 3(16 hrs)
Structures: concepts, basic modeling concepts, interactive graphics, logical classification of input devices, input functions, interactive picture construction techniques.
3D Concepts: Introduction to 3D graphics, display methods, 3D representations-polygon surfaces.

Module 4(16 hrs)
Definition of Multimedia ; Applications, Hardware and Software requirements for creating multimedia ; Building blocks of multimedia – text, graphics(image), video, audio, animation ; Different types of animation ; Brief overview of stages in execution of multimedia project – pre production, production and post production phases.

Module 5(12 hrs)
What is Compression ; Lossy and Lossless compression ; Compression techniques – RLE in text and image, LZW, Huffman's Coding, GIF, JPEG, MPEG, Fractal, Wavelet ;

Image Filetypes; Advanced Multimedia – Virtual Reality, Augmented Reality, Video Conferencing, Morphing, voIP, Video on Demand .

Books of study:
1. Computer Graphics – Hearn & Baker-Pearson Prentice Hall, 2005.
2. Multimedia : Making It Work - Tay Vaughan – 5th Edition – Tata Mc Graw Hill

References
1. Computer Graphics Principles and Practice- Foley, Van Dam, Feiner, Hughes, Pearson education,2006.
2. Principles of Interactive Computer Graphics – Newman S Sproull(Mc-Graw Hill)
3. Fundamentals of Multimedia – Ze-Nian Li,Mark S Drew – Pearson Education
4. Multimedia Communications – Applications, Networks, Protocols and Standards – Fred Halsall – Pearson Education.
5. Interactive Communication through Multimedia – An overview -NIIT.
6. Computer Networks - Andrew S Tanenbaum – 4th Edition, PHI.

BCS603(A): DATA MINING

Unit I: Introduction – Data Mining, Data Ware House, Transactional Databases, Data Mining Functionalities – Characterization and Discrimination, Mining frequent patterns, Association and correlation, Classification and Prediction, Cluster Analysis, Classification of Data Mining Systems, Data Mining Task Primitive, Integration of Data Mining systems, Major issues in Data Mining, Data integration and transformation, Data reduction, Data discretization.

(Chapter 1)

Unit II: Data Warehouse and OLAP technology – Data Warehouse, Multidimensional data Model, Data warehouse architecture, Data Warehouse implementation, OLAP, Data Warehouse and data mining.

(Chapter 2, 3)

Unit III: Association Rules and Classification Concepts – Efficient and Scalable Frequent item set Mining methods, Mining various kind of association rules, from association mining to Co-relation analysis, Classification and prediction, Issues, Classification by Decision tree induction, Bayesian Classification, Rule-based classification, Support Vector Machines, Learning from your neighbors, Prediction.

(Chapter 5, 6)

Unit IV: Cluster Analysis – Definition, Types of data in cluster analysis, A categorization major Clustering methods- Partitioning methods, K-means and k-medoids, from k-medoids to CLARANS, Hierarchical methods, Density based methods.

(Chapter 7)

Unit V: Mining Complex Data – Spatial Data Mining, Multimedia Data Mining, Text Mining and Mining WWW.

(Chapter 10)

Book of study:

Jiawei Han and Micheline Kamber   Data Mining - Concepts and Techniques (Second Edition) Elsevier, 2006

Reference:
1. Witten and Frank
   Data Mining – Practical Machine Learning Tools and Techniques (Second Edition) Elsevier, 2005
2. Soman, Divakar and AjayData Mining – Theory and Practice PHI, 2006

BCS603(B): Client Server Computing

Unit 1

Overview of C/S Computing: Definition, Benefits & Evolution, Hardware & Software, Trends, Evolution of operating systems, networking trends.
Overview of C/S applications: components, classes, categories.
Overview of C/S computing: Dispelling the Myths, Obstacles- Upfront and hidden, open systems and standards, Standards setting organizations, factors of success.

Unit 2

Client hardware and software: Client components and operating systems. What is GUI?,Xwindow vs. windowing, database access.
Application logic client software products: GUI environments, converting 3270/5250 screens, database access tools.
Client requirements: GUI design standards, Open GUI standards, Interface dependents, testing interfaces, development aides.

Unit 3

Server hardware: Benchmarks, categories of servers, features and classes of server machines.
Server Environment: eight layers of software's, network management and computing environments, extensions, network operating systems, loadable modules.
Server operating systems: OS/2, Windows new technology, UNIX based operating systems.

Unit 4

Server Requirements : Platform independence, transaction processing, connectivity, intelligent database, stored procedures, Triggers, Load Leveling, Optimizer, testing and diagnostics tools, real ability backup and recovery mechanisms.
Server data management and access tools: Data manager features, data management software, database gateways. LAN hardware and software, Network Operating Systems.

Text
1. Dawna Travis Dewire , Client Server Computing, McGraw Hill International

References
1. Tanenbaum and Van Steen, Distributed Systems – Principles and Paradigams,
                                    Pearson Education, 2005
2.   Orfali,Harkey and Edwards, The Essential Client server Survival guide, 2nd edition
                                    Galgotia, 2003
3.   Jeffrey.D.Schan, C/S Application and Architecture, Novell Press, BPB
4. Joe Salami, Guide to C/S Databases, Bpb Publn., 1994
5. David Vaskevitch , Client Server Strategies, Galgotia, 1994.

BCS603(C): Digital Image Processing

Unit 1: Introduction – steps in image processing, Image acquisition,
representation, sampling and quantization, relationship between pixels. – color
models – basics of color image processing.

Unit 2: Image enhancement in spatial domain – some basic gray level
transformations – histogram processing – enhancement using arithmetic , logic
operations – basics of spatial filtering and smoothing.

Unit 3: Image enhancement in Frequency domain – Introduction to Fourier
transform: 1- D, 2 –D DFT and its inverse transform, smoothing and sharpening
filters.

Unit 4: Image restoration: Model of degradation and restoration process – noise
models – restoration in the presence of noise- periodic noise reduction.. Image
segmentation: Thresholding and region based segmentation.

Unit 5 : Image compression: Fundamentals – models – information theory –
error free compression –Lossy compression: predictive and transform coding.
JPEG and MPEG standard.

 Book of Study:
R.C. Gonzalez, R.E.Woods, 2002, Digital Image processing, 2nd Edition, Pearson
Education.

Reference Books
(i) Anil K. Jain, 1994, Fundamentals of Digital image Processing, 2nd Edition,
Prentice Hall of India, New Delhi.
(ii) Pratt. W.K., Digital Image Processing, 3rd Edition, John Wiley & Sons.
(iii) Rosenfled A. & Kak, A.C, 1982, Digital Picture Processing, vol .I & II, Academic
Press.
3. Website, E-learning resources
(i) http://www.imageprocesssingplace.com/DIP/dip-downloads/

BCS603(D): BIO-INFORMATICS

Unit 1: Fundamental Of Biological Systems: Cell- cell organelles- Eukaryotic, Prokaryotic cell- Cell division- Mitosis- Meiosis- Macromolecules: Carbohydrates- Protein- Lipids- Nucleic acid- Structure of DNA and RNAVirology- Structure of HIV- AIDS- Cancer/ Oncogenes

Unit 2: Fundamentals Of Bioinformatics: Definition- Bioinformatics in industrial applications- Importance of Bioinformatics- Genomics- Types of Genomics- Proteomics- Sequence analysis- Sequence alignment- Hidden Markov Model- Types of Alignment- BLAST- FASTA- Interpro- Cog

Unit 3: Biocomputing And Bioprogramming: Rasmol- Clustalw- Biological databases- Nucleotide sequence database- Protein sequence database- EMBLDDBJ- Genalysis- Introduction to PERL and Bio-PERL- Introduction to SQL commands.

Unit 4: Linux And Unix For Bioinformatics: Basic Unix commands- Basic Linux commands- Web resources in Bioinformatics.

Unit 5: Applied Bioinformatics: Commercial Bioinformatics- Definition for Bioinformatics company- Transcriptome- SNP's and their applications- Patenting and data generation from Patent literature for commercial benefits- PR and Bioinformatics.

Book of Study
 (i) V. R.Srinivas, 2005, Bioinformatics – A modern approach, Prentice Hall of India, New Delhi.
(ii) J Watson, Molecular Biology of the Cell. (Unit – 1)
(iii) A. Batiza, A. Finney, Schacter, Bernia Mullis, Kary B, 2005, Bioinformatics, Genomics, Proteomics: Getting the Big Picture, Chelsea House Publications, New York, (Unit – 2)
(iv) H. Rashidi, 2000, Bioinformatics Basics, CRC Press Ltd. (Unit - 2)
(v) Moorhouse, Michae Barry, Paul, 2004, Bioinformatics, Biocomputing and Perl: An Introduction to Bioinformatics Computing Skills and Practice, John Wiley & Sons. (Unit – 3)
(vi) Cynthia Gibas, Per Jambeck, 2001, Developing Bioinformatics Computer software, O'Reilly Publications, Sebastopol, USA (Unit – 3)
.
2. Websites, E-learning materials
(i) http://www.bioinformaticsonline.org/ch/cho1/index.html

BCS604: SEMINAR

BCS605: PROJECT
BCS606 : Viva-Voce