University of Gour Banga

Malda, Pin: 732103

Syllabus of B.Sc. Computer Science (General)

Full marks: 400

UNIVERSITY OF Gour Banga

Three-year B.Sc.(General) Courses of Studies in Computer Science effective from the Academic Session 2015-2016

Computer Science General Course Structure

Paper	Type/Marks/Time	Group	Title	Periods
Part-I				
I	Theoretical- 100 (Multiple Choice- 30; 30 Mins) Written- 70; 2.30 hrs.)	A	Computer Fundamentals	**40**
		B	Computer Architecture and Organization	**40**
		C	Digital Logic	**40**
II	Practical- 50	A	Familiarity with Windows Based PC Software	**50**
Part-II				
III	Theoretical- 100 (Multiple Choice- 30; 30 Mins) Written- 70; 2.30 hrs.)	A	Data Structures	**40**
		B	Operating Systems	**40**
		C	Programming in C	**40**
IV	Practical- 50	A	**I:** Programming in C	**40**
			II: Familiarity with single and multi user systems.	**10**
Part-III				
V	Theoretical- 100 (Multiple Choice- 30; 30 Mins) Written- 70; 2.30 hrs.)	A	Database Management Systems	**45**
		B	Data Communication and Computer Networks	**45**
		C	System Analysis and Design	**30**

PART – I

Paper - I (Theoretical- F.M. 100)

Group A: Computer Fundamentals

Introduction to Computer and Problem solving: Information and Data. Hardware: CPU, Primary and Secondary Storage, I/O devices, Bus structure. Software : System and Application, Generation of Computers: Super, Mainframe, Mini & Personal Computer, Introduction to Programming Languages: Machine, Assembly and High level, Problem Solving: Flow charts, Decision Tables and Pseudo codes. Number representation: Weighted Codes, Non- Weighted Code, Positional, Binary, octal, decimal, hexadecimal, Binary Coded Decimal (BCD), Conversion of Bases. Complement notions, Binary Arithmetic, Binary Codes: Gray, Alphanumeric, ASCII, EBCDIC, Single error-Detecting and Correcting Codes, Hamming Codes. Fundamentals of Boolean algebra, Switches and Inverters, Functionally Complete Gates (AND, OR, NOT), NAND, NOR, Switching function and Boolean

Function. De Morgan's Theorem, Minterm, Truth table and minimization of switching function, Algebraic and K-map method. Elements of computer Networks: Different topologies of network, Centralized and Distributed Processing, LAN, MAN and WAN. Media telephone lines, Co-axial cables, Optical fiber, Satellite, VSAT; Basic components- LAN card, Modem; TCP/IP protocol. Concept of E-mail and Internet.

Group B: Computer Architecture and Organization

Integer Representation: Unsigned, signed magnitude, 1's complement, 2's complement, biased, floating point representation- Single and double precision IEEE format. Algorithms of integer and floating point addition, multiplication/division; range, precision and accuracy. Basic structure of an ALU. **CPU:** Addressing modes, instruction set, instruction format, interrupts and subroutines, CISC and RISC processor. CPU registers: PC, MAR, MBR etc. **Control Unit:** Instruction and Execution Cycle, Control of sequence, jump and branch instruction; shift instruction. I/O*: Controller, Interrupt, DMA, Memory mapped I/O, System buses. Memory: Memory devices*- Static and Dynamic RAM, ROM, cache; Secondary memory (Floppy disc, hard disc, tape, CD ROM, DVD); large memory using chips.

Group C: Digital Logic

Logic gates: AND, OR, NOT, XOR etc; Combinational circuits; simple logic design using logic gates and Universal Gates : Half adder/subtractor Full adder/subtractor Encoder, Decoder, Code Converter, Comparator, Multiplexer, De-multiplexer, parity Checker and Generator. Implementation of basic Sequential circuits; flip-flops: RS, D, JK, T and master slave; Implementation of Counters: Synchronous and Asynchronous; multi-vibrators: astable and monostable; Registers and shift registers.

Paper - II (Practical- F.M. 50)

Group A: Familiarity with Windows Based PC Software

Word-processing: Opening, creating, saving, quitting documents. Using menus and toolbars. Text: Copy, delete, move, spell check; Character & page formatting; size, font, header, footer, bordering, coloring, margins and justification, graph, text. Picture: Creation, Editing and import, Printing. Use of other available features.

Document Preparation & Presentation: Slide Preparation, Adding special Effects, Adding Picture, Animation, Time Control, Slide Show.

Spreadsheet: Data Entry, Moving data, range selection, use of toolbars and menus: editing; calculation and use of formula, display, print. Graphs and charts: formatting facilities for presentation (e.g. changing fonts, colors, sizes, adding titles, legends, and gridlines). Macros: Creation, running shortcut.

Marks Allotment:	**Sessional –**	**05**
	Experiment –	**35**
	Viva-Voce –	**10**

Text Books:

1. Introduction to Computer Science, by P.K.Sinha (PHI)
2. Digital Logic and Computer Design by M.Morris Mano, PHI
3. Digital Fundamentals by Floyd, Pearson Education
4. Computer System Architecture by M. Morris Mano
5. Computer Organization and Architecture by William Stallings, Pearson Education
6. Computer Fundamentals: Architecture and Organization by B.RAM, New age International.

PART – II

Paper - III (Theoretical- F.M. 100)

Group A: Data & File Structures

Concepts of data types; elementary structures; words and their interpretation. Array: Types, memory representation, address translation; Functions of single and multi dimensional arrays with examples; Linked structures: singly linked list; List manipulation with pointers: Examples involving insertion and deletion of elements; stacks and queues: Definition representation, uses and applications- Recursion, Postfix Conversion and Evaluation, Application of Queues; Binary trees: Definition, Quantitative properties, Path length: Internal and external properties, minimum and maximum path length of a binary tree, Importance; searching: Linear and binary search, Sorting: Terminology, performance evaluation, Different sorting techniques (Bubble, insertion, selection, Quick, merge, Heap) with iterative and/or Recursive description, Advantages and disadvantages.

Group B: Operating Systems

What is OS; concept of process, files, shell, system calls. Structures: Monolithic, layered, virtual, client-server model. Concept of Synchronization: semaphores, critical regions, monitor etc., Inter process communication mechanisms. Processor; message passing, scheduling, I/O: devices and devices controllers; interrupt handler and device drivers. Memory: multiprogramming, swapping, paging, page replacement techniques; File system: files and directories, file servers, security and protection. Deadlock: how it can happen; ideas on detection and prevention. Case study: DOS, UNIX, WINDOWS.

Group C: Programming in C

Basic structure: character set, keywords, identifiers, constants, variable type declaration. Sample programs, Preprocessor. **Operators:** Arithmetic, Relational, Logical, Assignment, increment and decrement , conditional operator, operator precedence and associability; arithmetic expression-evaluation. Character I/O, Escape sequence and formatted I/O. **Branching and Looping:** if, if-else, while, do-while, for. **Arrays:** One-dimensional and 2-dimensional.Different types of uses. String handling with arrays- read and write, concatenation, comparison, string functions. **User defined functions:** Need; Call by Reference and Call by value; return values and types; nesting of functions; recursion. **Structures:** Initialization; arrays of a structure, arrays within structures, structure within structure, size of structures, Dynamic Storage Allocation. **Pointers:** Declaration and initialization; operators; pointer arithmetic; accessing variables, pointer & arrays, strings, functions, Linked lists, concepts and use in C with different examples. **File handling:** Opening & closing, I/O. Other Features:- bit level operations, macro definitions, union, and command line arguments.

Paper - IV (Practical- F.M. 50)

Group A: Section I: Programming in C

Problems should cover basic features of the Language.

Section II: Familiarity with single and multi user systems.

Internal and external Commands. File name and extension, Batch File creation, Command Line Arguments, System Configuration. Menus, Folders, Program Manager, File Creation, View and sort files, Document Preparation and Presentation. Files and Directories, Copy, Delete, Rename directory, Creation, Navigation, Editor.

Marks Allotment:	**Sessional –**	**05**
	Experiment I –	**30**
	Experiment II –	**05**
	Viva-Voce –	**10**

Text Books:

1. Data Structure by Ellis Horowitz, Sartaz Sahani, Galgotia Publication.
2. Data Structure Using C by S. K. Bandyopadhyay and K. N. Dey, Pearson Education
3. Data Structures and Algorithm Analysis in C by Mark Allen Weiss, 2nd Edition, Pearson Education
4. C Programming by Karnighan & Ritchie, PHI
5. Programming through C by Richard Johnsonbaugh and Martin Kalin, Pearson Education
6. A Book on C by Kelley and Pohl, Pearson Education
7. Operating Systems by H.M.Deitel, 2nd Edition, Pearson Education
8. Operating System Concepts, A.Silberschatz, Peter B. Galvin, G. Gagne, 6th Edition, John Wiley & Sons, Inc.

PART – III

Paper - V (Theoretical- F.M. 100)

Group A: Database Management System

Basic concepts: Advantages of DBMS, ANSI / SPARC architecture, physical conceptual and external models; Entity Relationship diagram(ERD); Relational Data models, Relational algebra, Query languages: SQL, File organization: Sequential, indexed sequential ; Query Languages: Relational Algebra; Functional dependencies and normal forms: 1NF, 2NF, 3NF, and BCNF. SQL; Security; Integrity.

Group B: Networks and Internet

Concepts of centralized and distributed computing; advantages of networking; layered Architecture; OSI and TCP/IP model: : basic features; LAN and WAN; simple PC based networked Examples: Block diagram, mode of operation and characteristic features. Internet: What is Internet, Basics of Web site, WWW, Browser, HTML- Tags and Features; Internet Addressing: Physical, Logical, Port; servers, clients, Port, Domain Name Server (DNS); Accounts; ISP; Connection: Dial Up, ISDN, ASDN, Cable modem; E-mail: Account, sending, receiving, Mailing List, IRC; Voice & video conferencing.

Group C: System Analysis and Design

Software Life Cycle, Different Models: Waterfall, Spiral, Etc; Software Requirement Analysis & Specification, Structured Analysis, DFD, Data Dictionary, Structured Design, Structure Charts, Software Testing: White Box and Black Box Testing.

Text Books:

1. Data Communications and Networking by Behrour A. Forouzan, 4th Edition, TMH
2. Data and Computer communication by William Stallings, 6th Edition, Pearson Education
3. Computer Networks by Tanenbaum, Pearson Education
4. An Integrated Approach to Software Engineering by Pankaj Jalote, Narosa Publishing House
5. Introduction to System Analysis and Design by Igor Hawryszkiewycz, PHI
6. Database System Design by Elmasri, Navathe, Somayajulu, Gupta, Pearson Education
7. Database Systems: Concept, Design and Application by S. K. Singh, Pearson Education, 1st Edition
8. An Introduction to Database Systems by C.J. Date, A.Kannan, S.Swamynathan, Pearson Education
9. Relational Database Design by Jan L. Harrington, an imprint of Elsevier