

SYLLABUS FOR 3-YEAR B.Sc. (GENERAL) COURSE IN COMPUTER SCIENCE

[w.e.f. academic year 2005-2006]

SYLLABUS FOR 3-YEAR B.Sc. (GENERAL) COURSE
IN
COMPUTER SCIENCE
[To be effective from academic year 2005-2006 and onwards]

PART – I

PAPER – I (Theory, Full Marks: 100)	No. of Lecture Hours
1.1 COMPUTER FUNDAMENTALS	[25]
1.1.1 Introduction to Computers and Problem Solving	[10]
1.1.2 Number Systems and Arithmetic	[10]
1.1.3 Boolean Algebra	[05]
1.2 PROGRAMMING LANGUAGE – I	[25]
1.3 OPERATING SYSTEMS	[25]
1.4 DIGITAL LOGIC	[25]

PART – II

PAPER – II (Theory, Full Marks: 100)	No. of Lecture Hours
2.1 COMPUTER ORGANIZATION	[30]
2.2 DATA & FILE STRUCTURES	[40]
2.3 SYSTEM ANALYSIS & DESIGN	[30]
PAPER – III (Practical, Full Marks: 100)	No. of Lecture Hours
3.1 PROGRAMMING IN C	[60]
3.2 UTILITY SOFTWARES & OPERATING SYSTEMS	[40]
3.2.1 Screen Editor	
3.2.2 Electronic Spreadsheets	
3.2.3 Database Package	
3.2.4 Presentation Tools	

PART – III

PAPER – I V: GROUP – A (Theory, Full Marks: 65)	No. of Lecture Hours
4.1.A DATABASE MANAGEMENT SYSTEM	[35]
4.2.A VISUAL PROGRAMMING	[15]
4.3.A NETWORKS & INTERNET	[15]
PAPER – I V: GROUP – B (Practical, Full Marks: 35)	No. of Lecture Hours
4.1.B ANY RDBMS	[20]
4.2.B HTML	[05]
4.3.B VISUAL LANGUAGES	[10]

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DETAIL SYLLABUS FOR 3-YEAR B.Sc. (GENERAL) COURSE
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PART – I

PAPER – I

1.1 COMPUTER FUNDAMENTALS [25]

1.1.1 Introduction to Computers & Problem solving, Generation of computers; Computer system: Basic Block Diagram, super, Main Frame, Mini & Personal computer, Nomenclature; Software: Systems and Application; Hardware & Software hierarchy; Computing environment, Algorithms: importance, essential features, design & classifications; Complexity: notation, time & space; Computability & correctness concepts; Structured programming concepts; process of problem solving, pseudo codes.

[10]

1.1.2 Number Systems & Arithmetic Number System: Positional, Non-positional, binary, octal, decimal, hexadecimal and their representation; Methods of conversion from one base to another; Unsigned, Signed, 1's Complement, 2's Complement, sign-magnitude and excess notation; range of values; Binary Arithmetic: Fixed & Floating point numbers, representation, biased exponent, range & precession, errors, overflow, underflow, BCD arithmetic.

[10]

1.1.3 Boolean Algebra: Concepts propositional logic; Two variable Boolean algebra definitions, postulates, properties, simplification of logical expressions using properties and maps (up to 4-variables), Minterm, Maxterm, expressions.

[05]

1. Digital Logic & Computer Design – M.Mano, PMI
2. Digital Principal and Application – Manvino & Leach, TMH
3. Computer Fundamentals -- Rajaraman

1.2 PROGRAMMING LANGUAGE – I (C-PROGRAMMING)

Introduction: Basic Structure, Character Sets, Keywords, Identifiers Constants, Variable type declaration; Execution of some simple sample programs. Operators: Arithmetic, Relational, Logical and Assignment, Increment, Decrement and Conditional; Operator Precedence and Associations; Expressions in C; Expression evaluation and type conversion; Formatted input & output; Statements in C: Assignment, Control and Loop statements; Arrays: Single and Multi dimensional, Initialization, String handling with arrays, String handling functions. Functions in C:

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Need, Simple examples, argument passing in C, Functions & their use, Return value and their types, Recursion. Structures: Definitions & initialization, Arrays of structures, Arrays within structures. Pointers: Declaration & Initialization, Accessing variables through pointers, Pointer arithmetic, Pointers & arrays; Strings; Pointer to Functions & Structures. File Access: Opening & Closing, I/O Operations. [25]

1. Programming in C – Gottfried Saums
2. Programming in ANSI C – E. Balagurusamy, TMH
3. Spirit of C – Mullish Cooper

1.3 OPERATING SYSTEMS

What is OS; Concepts 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 Device Controllers; Interrupt handlers 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, and Windows. [25]

1. Operating System Concept – Galvin
2. Modern Operating System – Tanenbaum

1.4 DIGITAL LOGIC

Logic gates: AND, OR, NOT, XOR; Combinational Circuits; Simple logic design using logic gates. Alphanumeric Codes: ASCII, EBCDIC; Combinational Circuits: Encoder, Decoder, Code Converter, Comparator, Adder/ Subtractor, Multiplexer, Demultiplexer, Parity Generator. Basic Sequential circuits; Flip-Flops: RS, Clocked RS, D, Edge-Triggered D, JK, T and Master-Slave; Schmitt-trigger; Multi-vibrators: Astable and monostable; Registers and shift registers; Counters; D/A & A/D Converters. [25]

1. Digital Logic & Computer Design – M.Mano TMH
2. Modern Digital Electronics – R.P.Jain TMH

PART – II

PAPER – II

2.1 COMPUTER ORGANIZATION

Computers; Basic Building Blocks and Sub-systems, Control and Intra-connection; Bus; Tri-state devices; CPU: Registers, Instruction Formats & Design Strategies; Addressing Modes: Direct, Indirect, Immediate, Relative, Implied, Indexed, 0-1-2 Addressing Schemes; Stack Organization and Implementation. Memory: Organization, Addressing, Reading and Writing, SAM, RAM & ROM, and Difference Storage Technology. [30]

1. Computer Systems Architecture M.Mano TMH
2. Structured Computer Organization – A.S.Tanenbaum

2.2 DATA & FILE STRUCTURES

Definitions: Concepts of data types, Elementary Structure, Words and their interpretation; Arrays: 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; Stack and Queues: Definition, Representation, Uses and applications-Recursion, Postfix Conversion and Evaluation, Applications 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, Heap) with iterative and/or Recursive description, Advantages and disadvantages. File Structure: I/O operations on files. [40]

1. Fundamentals of Data Structure through C – Sahani et. Al.
2. Data Structure using C/C++ - A.S.Tanenbaum etl.

2.3 SYSTEM ANALYSIS & DESIGN

System Analysis Fundamentals: Definition of software product, System Analysis Paradigms; System Analysis: An abstraction, Partitioning and projection, Systems specification, Software Requirements Specification (SRS) standards, Formal Specification methods, Specification tools, Flow based, Data based Analysis. Systems Design: Idealised and constrained design, Process oriented design. Data oriented design (E-R Modelling), Cohesion and Coupling, Design matrices, Design documentation standard, DFD. [30]

1. Software Engineering – Rajiv Mall

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2. An Integrated Approach to Software Engineering – P.Jalote
3. Analysis and Design of Information Systems – James A. Senn
4. System Software – L.L.Beck

5. System Analysis & Design – V.Rajaraman
6. System Programming – J.J.Donovan
7. Introduction to Algorithm – T.Corman et. Al.
8. Introduction to System Analysis & Design – I.T.Hawryszkiewycz

PAPER – III(Practical)

3.1 PROGRAMMING IN C

Execution of some simple sample programs. Operators: Arithmetic, Relational, Logical, and Assignment, Increment, Decrement and Conditional; Operator Precedence and Associations: Expressions in C; Expression Evaluation and Type conversion; Formatted input and output. Statements in C: Need, Simple examples, Argument passing in C, Functions and their use, Return values and their types, Recursion. Structures and Unions, Array within Structures, Array of Structures. Pointers, Accessing variables through pointers, Pointer arithmetic, Pointers and arrays; Pointer to functions and structures; Strings. File access: Opening and Closing, I/O Operations.[60]

3.2 UTILITY SOFTWARES & OPERATING SYSTEMS [40]

- 3.2.1 Screen Editor: Working with Command line editor – EDLIN, EDIT, VI; Graphics Editor – Notepad, WordPad [10]
 - 3.2.2 Electronic Spreadsheets: MS-Excel- Worksheet Creation, Formula, Function, Chart & Graphs [10]
 - 3.2.3 Database Package: MS-Access – Create Database, Elementary SQL commands and its application [10]
 - 3.2.4 Presentation Tools: MS-PowerPoint – Slide Creation, Animation, Hyper linking [10]
1. 10 Minutes Guide to Microsoft Office 2000, Acklen, PHI
 2. Step by Step MS-Access, PHI
 3. Using Microsoft Office – 2000, Bott, PHI

PART – III

PAPER – I V

GROUP – A

4.1.A DATABASE MANAGEMENT SYSTEM

Basic concepts: Advantages of DBMS, ANSI/SPARC architecture, physical, conceptual and external models; Entity-Relationship diagrams; **Data models:** Relational, Hierarchical and Network. **File organization:** Sequential, indexed sequential, random, inverted; **Query Languages:** Relational Algebra; Functional dependencies and normal forms: 1NF, 2NF, 3NF and BCNF; SQL; Security; Integrity; **Case Study:** ORACLE/ MY-SQL/ACCESS. [35]

1. Database Concepts and Systems – Ivan Bayross, SPD
2. Special Edition Using Oracle Applications, Boss Corporation, PHI
3. Using Oracle Applications — Bob Roski

4.2.A VISUAL PROGRAMMING

Basic features; Building objects with classes; Operations with objects; Class libraries; Multitasking and multithreading; Forms; Objects; Events; Functions: Procedures; Methods; ODBC driver; Front end development with database; MFC.

1. Programming in Visual Basic—P.K.McBride, BPB
2. The Visual Basic 6.0 – Dietel, Pearson.

[15]

4.3.A NETWORKS & INTERNET

Networks: Concepts of centralized and distributed computing: Advantages of networking; Layered architecture; OSI architecture: Basic features, LAN, MAN and WAN; Simple PC based network examples: block diagram, mode of operation and characteristic features.

Internet: What is Internet; Basics of Web Site, WWW; Browser, HTML-Tags and Features; Servers; Clients; Port; Domain Name Server (DNS); Accounts; ISP; Connection: Dial Up, ISDN, ADSN, Cable modem; Email: Account, sending, receiving, mailing list, IRC; Voice & Video conferencing. [15]

1. Internet and Introduction-CIStems, TMH
2. Data & Computer Communication – Stallings
3. Computer Networks – A.S.Tanenbaum
4. Computer Network – U.Black

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5. Special Edition Using HTML 4, 6th Edn. Holzschlag, PHI
6. Using HTML-4 4th Edn., Phillips, PHI
7. Internet Handbook – TMH Cistern Series
8. Mastering Web Design-John McCoy, BPB

PAPER – I V

GROUP – B(Practical)

4.1.B ANY RDBMS	[20]
(Related to 4.1.A)	
4.2.B HTML	[05]
(Related to 4.3.A)	
4.3.B VISUAL LANGUAGES	[10]
(Related to 4.2.A)	