

**MANIPUR UNIVERSITY  
CANCHIPUR: IMPHAL**

SYLLABUS

FOR

COMPUTER SCIENCE  
(ELECTIVE & HONOURS)

Semester System

MANIPUR UNIVERSITY  
CANCHIPUR, IMPHAL – 795001

**FIRST YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
1 <sup>st</sup> Semester	CS 101	IT TOOLS & APPLICATIONS	60
	CS 101P	PRACTICAL	40
2 <sup>nd</sup> Semester	CS 202	PROBLEM SOLVING TECHNIQUES & PROGRAMMING IN C	60
	CS 202P	PRACTICAL	40

**SECOND YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
3 <sup>rd</sup> Semester	CS 303	DIGITAL COMPUTER DESIGN	60
	CS 303P	PRACTICAL	40
4 <sup>th</sup> Semester	CS 404	OBJECT ORIENTED PROGRAMMING IN JAVA	60
	CS 404P	PRACTICAL	40

**THIRD YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
5 <sup>th</sup> Semester	CS 505	DATA STRUCTURES USING C	100
	CS 506	COMPUTER NETWORKS	100
	CS 507	PRACTICAL (DATA STRUCTURES USING C)	100
6 <sup>th</sup> Semester	CS 608	DATABASE MANAGEMENT SYSTEMS	100
	CS 609	OPERATING SYSTEMS	100
	CS 610	PRACTICAL (DBMS & OS)	100

## Syllabus for B.Sc. Computer Science Elective (Ist Year)

Year	Semester	Paper	Topic	Marks
F I R S T Y E A R	Sem-I (July-Oct)	CS101 (Theory) IT Tools & Applications	Introduction to Computer	10
			MS-Windows	10
			MS-Words	15
			MS-Excels	15
			MS-PowerPoint	05
			Introduction to Internet	05
		Total Marks	60	
		CS101P (Practical)	MS-Word	15
	MS-Excel		15	
	MS-PowerPoint		5	
	Introduction to Internet		5	
	Total Marks		40	
	Sem-II (Jan.Apr)		CS202 (Theory) Problem Solving Techniques & Programming in C	Techniques of Problem Solving
		C fundamentals		10
		Input Output Functions		10
		Functions		10
Arrays		10		
Pointers		10		
Total Marks		60		
CS202P (Practical)		Programming in C	40	
	Total Marks	40		

## Syllabus for B.Sc. Computer Science Elective (2<sup>nd</sup> Year)

Year	Semester	Paper	Topic	Marks
S E C O N D Y E A R	Sem-III (July-Oct)	CS303 (Theory) Digital Computer Design	Information Representation	10
			Binary Logic	10
			Digital Logic	20
			Combinational Circuits	20
			Total Marks	60
		CS303P (Practical)	Study of Logic Gates	10
			Implementation of Logic circuits	10
			Adder and Subtractor	20
	Total Marks		40	
	Sem-IV (Jan.-Apr)	CS404 (Theory) Object Oriented Programming in Java	Introduction to Java	20
			Classes	20
			Packages	10
			I/O Streams	10
			Total Marks	60
CS404P (Practical)		Programming in Java	40	
	Total Marks	40		

## Syllabus for B.Sc. Computer Science Honours (3<sup>rd</sup> Year)

Year	Semester	Paper	Topic	Marks
T H J R D Y E A R	Sem-V (July-Oct)	CS505 (Theory) Data structures using C	Definition of a Data Structure	20
			Stacks and Queues	20
			Singly Linked List	20
			Trees and Graph	20
			Sorting and Searching	20
			Total Marks	100
		CS506 (Theory) Computer Networks	Basic of computer networks	25
			Transmission Media	25
			Data communication components	25
			TCP/IP Protocol suite	25
			Total Marks	100
		CS507 (Practical)	Data Structures using C	100
			Total Marks	100
		Sem-VI (Jan.-Apr)	CS608 (Theory) Database Management Systems	Introduction
	Entity Relationship(ER) Modelling			15
	Relational Data Model			20
	Database Design			15
	Transaction Processing			15
	Case Study			20
	Total Marks			100
	CS609 (Theory) Operating Systems		Operating System	25
			Structures of OS	15
			Concepts of Synchronization	10
			Processor Management	10
			I/O Management	10
			Memory Management	10
File Systems			10	
Dead Lock			10	
Total Marks	100			
CS610 (Practical)	DBMS and Operating Systems	100		
	Total Marks	100		

## Semester I : CS 101 - IT Tools and Applications

Full Marks: 60,  
10 marks

### Unit 1. Introduction to Computer:

Definition, Block Diagram along with its components, characteristics & classification of Computer.

Hardware (CPU, Primary and Secondary storage, I/O devices, Bus structure, Computer Peripherals - VDU, Keyboard, Mouse, Printer),

Software ( System and Application. Different System Software)

Programming Languages: Machine Language, Assembly Language, High Level Language, Object Oriented Language.

### Unit 2. MS Windows

10 marks

An overview of different versions of windows.

The User Interface : The Desktop, My Computer, Recycle Bin, Status Bar, Taskbar, Start button and Menu selection, Title Bar, Control Panel, Icons on the screen.

Windows Explorer, Viewing of Files & Folders, Creating & Renaming of Files & Folders and shortcuts, Copy & Paste, Drag & Drop, Opening & Closing of files & folders.

### Unit 3. MS-WORD

15 marks

Word processing concepts, Opening, Saving and Closing an existing document, moving around in a document, Manipulating Windows, various ways to select the text, insert & delete, moving and copying text, Proofing document with spell check and grammar check, auto-correct and auto-complete, Auto-text, borders and shading, Headers & Footers, Handling graphics, Creating charts & Tables, Mail merge.

### Unit 4. MS-EXCEL

15 marks

Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell/formula, Copying and Moving data from selected cells, Handling operators in Formulae, Functions: Mathematical, Logical, Statistical, Text, financial, Date and Time functions, Using function Wizard.

Formatting a worksheet: formatting cells-changing data alignment, changing date, number, character, or currency format, changing font, adding borders and colours , Charts and Graphs-Creating, Previewing, Modifying Charts.

### Unit 5. MS-POWERPOINT

5 marks

Introducing PowerPoint, Building a presentation, Outlining the presentation, Creating a text slide, Creating chart slide, Formatting charts, Creating organisational charts & tables, Customizing a presentation, Drawing on slides, Creating slide shows.

### Unit 6. INTRODUCTION TO INTERNET

5 marks

Basic internet terminology: World Wide Web, Browsers, E-mail, Search Engines.

#### Text book :

IT Tools and Applications ; Satish Jain, Shashank Jain, Shashi Singh and Dr. Madulika Jain, BPB Publications

#### Reference book :

S. Sagman, "Microsoft Office 2007 for Windows", Pearson Education

## Semester 1 - Practical I – CS 101P - IT Tools and Applications

Full Mar

Sample problems for practical in MS-WORD

15 marks

1. Perform the following operations by taking a simple text.
  - a) make a paragraph from the text bold-face, underline, italic
  - b) add a formula using subscript and superscript.
  - c) format a paragraph-left justified, right justified, centred
  - d) spacing the text – single, one-half and double.
  - e) select a part of the text & perform copy, cut & paste.
  - f) replace a word e.g. “IT” by “information Technology”.
  - g) insert page no./ some text in header & footer.
2. Prepare a simple Invitation Card using different font styles & sizes and send it to 10 friends using Mail-merge technique.
3. Create a table to accommodate your name, class, roll number and marks.

II. Sample problems for Practical in MS-EXCEL.

15 marks

Create a spreadsheet corresponding to the following figures:

Student	Test1	Test2	Test3	Test4	Total	Wt. Average
Kanta	90	87	84	95	?	?
Surmala	89	79	78	92	?	?
Soni	93	88	68	79	?	?
Gobind	94	79	80	93	?	?
Test Average	?	?	?	?	?	?

- a) Calculate Wt. average using formula,  
$$\text{Wt. average} = (\text{test1} + \text{test2} + \text{test3} + \text{test4}) / 4$$
  - b) Calculate Total & Average for each test using spreadsheet function.
- III. Sample problems for Practical in MS-Power-point
- 5 Marks
1. Create a presentation that consists of four slides, (minimum) on the following topics
    - a) Parts of a Computer
    - b) Advantages of Computer
    - c) Applications of computer
- IV. Sample problems for Practical in Internet.
- 5 Marks
1. Opening of an e-mail account.
  2. Searching a topic on the web using a search engine.

**Semester 2 : CS 202 - Problem Solving Techniques and Programming in C**  
**Full Marks: 60**

- 10 marks
- Unit 1. Techniques of Problem solving:  
Concept of problem solving, problem definition, Flowchart, Algorithms, pseudo-code, structured programming concepts, programming methodologies viz. top-down and bottom up programming.
- 10 marks
- Unit 2. C fundamentals  
Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.
- 10 marks
- Unit 3. Data input output functions  
Simple C programs - Flow of control - if, if-else, while, do-while, for Loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.
- 10 marks
- Unit 4. Functions  
Definition proto-types - Passing arguments(including command line argument) - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.
- 10 marks
- Unit 5 . Arrays and structures  
Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.
- 10 marks
- Unit 6. Pointers and File  
Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files : creating, opening, reading, writing and closing a file.

**Text Books :**

1. E. Balagurusamy, Programming in Ansi C, 4<sup>th</sup> Edition.

**References:**

1. B.W. Kernighan and D M.Ritchie, The C Programming Language, 2nd Edition, PHI, 1988.
2. Gottfried,B.S, Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.
3. Computer Oriented Numerical Methods, V. Rajaraman, PHI.



**Semester 2 - Practical II – CS 202P - Problem Solving Techniques and Programming in C**  
**Full Marks: 40**

**I. Sample Programs for practical C:**

- Write a C program to exchange the values of the two variables without using a third Variable
- Write a C program to convert a temperature from one unit to another say Celsius to Fahrenheit.
- Write a C program to calculate the Compound interest accepting the necessary data from the keyboard.
- Write a C program to generate natural numbers up to n term.
- Write a C program to find the sum of n natural numbers.
- Write a C program to generate the first 10 even numbers and also find its sum.
- Write a C program to generate the first 10 odd numbers and also find its sum.
- Write a C program to find the HCF and LCM of two/three numbers.
- Write a C program to find the mean of n numbers.
- Write a C program to compute the standard deviation from a list of numbers.
- Write a C program to generate Prime numbers up to n terms
- Write a C program to find Factorial of a number.
- Write a C program to generate Fibonacci series of number up to n term.
- Write a C program to generate Fibonacci numbers between 1 and N using recursion, N being a natural number.
- Write a C program to reverse the digits of a given positive number using recursion.
- Write a C program to find the addition of 2 matrices.
- Write a C program to find multiplication of 2 matrices.
- Write a C program to find the length of a string and arrange the string in ascending order.
- Write a C program to count the number of characters, vowels, consonants and digits in a text line
- Write a C program to arrange the accepted numbers in ascending order and descending order.
  
- Write a C program to find the maximum & minimum from a given list of numbers.
- Write a C program that will read a positive no. from the keyboard and checks whether the no. is prime or not.
- Write a C program to find the sum of digits of an integer reducing it to a single digit.
- Write a C program to check whether a string is a palindrome.
- Create a file of records where the structure of each record is as follows : Name, Basic Pay, DA(37% of Basic Pay).
- Read the file created in the preceding question.
  
- Create a file of records where each records should contain the following fields : Name, Rollno, Mk1, Mk2,....., Mk6.
  
- Read the file created in the preceding question and Calculate the PC of each student.
- Write a C program using command line arguments to calculate the circumference of a circle whose radius is 5 cm.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

Semester 3 : CS 303 - Digital Computer Design

Full Marks: 60

- Unit 1. Information Representation: 10 marks  
Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode
- Unit 2. Binary Logic: 15 marks  
Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.
- Unit 3. Digital Logic: 20 marks  
Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.
- Unit 4. Combinational Circuits: 15 marks  
Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

Text Books

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

Reference Books

1. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill
3. Digital Principles and Applications, A.P. Malvino and D. Leach, Tata Mckraw Hill.

**Semester 3 – CS 303P - Digital Computer Design ( Practical)**

**Full Marks: 40**

I: Study of Logic Gates 10 Marks

1. Logic Gates using discrete components.
2. Verification of truth table for AND, OR, NOT, NAND, NOR and XOR gates.
3. Realisation of NOT, AND, OR, EX-OR gates with only NAND gates.
4. Realisation of NOT, AND, OR, EX-OR gates with only NOR gates.

II Implementation of Logic circuits 10 Marks

1. Verification of Associative law for AND, OR gates.
2. Karnaugh's Map reduction and logic circuit implementation.

III: Adder and Subtractor 20 Marks

1. Verification of Demorgans Law.
2. Implementation of Half- Adder and Half- Subtractor or.
3. Implementation of Full-Adder and Full Subtractor or.
4. Four bit binary Adder.
5. Four bits binary subtractor using 1's and 2's complement.

**Semester 4 : CS404 - Object Oriented Programming in Java**

**Full Marks: 60**

Unit 1. Introduction to Object Orientation Approach 10 Marks

History and evolution of Object Oriented Languages.

OOPs features : Encapsulation, Data Abstraction, Inheritance, Multiple Inheritance, Polymorphism, Message Passing, Extensibility, Persistence, Delegation, Genericity.

Unit 2. Introduction to Java 10 Marks

Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.

Unit 3. Classes 20 Marks

Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class.

Unit 4. Packages 10 Marks

Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading.

Unit 5. I/O Streams 10 Marks

File Streams - Applets - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation.

Reference books :

1. Cay S. Horstmann, Gary Cornell - Core Java 2 Volume I - Fundamentals, 5th Edn. PHI, 2000.
2. P. Naughton and H. Schildt - Java2 (The Complete Reference) - Third Edition, TMH 1999.
3. K. Arnold and J. Gosling - The Java Programming Language - Second Edition, Addison Wesley, 1996.

## Semester 4 : CS 404P - Object Oriented Programming in Java (Practical)

Full Marks: 40

- Write a Java program to generate natural numbers up to n term.
- Write a Java program to generate the first 10 even numbers and also find its sum.
- Write a Java program that will read a positive no. from the keyboard and checks whether the no. is prime or not.
- Write a Java program to find Factorial of a number.
- Write a Java program to find the maximum & minimum from a given list of numbers.
- Write a Java program to find the addition of 2 matrices.
- Write a Java program to find multiplication of 2 matrices.
- Write a Java program to implement bubble-sort.
- Write a Java program to find the sum of digits of an integer reducing it to a single digit.
- Write Java programs related to
  - Class and Objects.
  - Constructor and Operator overloading
  - Inheritance.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

**Semester 5 : CS 505 - Data structures using C**

**Full Marks: 100**

- UNIT 1. Definition of a Data structure 20 marks  
Primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists.
- UNIT 2. Stacks and Queues 20 marks  
Implementation of Stack using arrays and link list, application of stack - Infix to Postfix Conversion, Queues - Circular Queue.
- UNIT 3. Linked List 20 marks  
Singly linked list Operations, Application - Representation of a Polynomial, Polynomial Addition; Doubly Linked List - Operations.
- UNIT 4. Trees and Graphs 20 marks  
Binary Trees, Operations - Tree Traversals; Graph - Definition, Types of Graphs, Traversal - Shortest Path; Dijkstra's Algorithm.
- UNIT 5. Sorting and searching 20 marks  
Searching techniques - linear, binary, sorting- bubble, insertion, selection, merge and their complexity.

Text Book :

1. Data structure using C and C++ : Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum , Second Edition, Pearson Prentice Hall.

References:

1. E.Horowitz and S. Shani Fundamentals of Data Structures in C, Galgotia Pub. 1999.
2. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.
3. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PHI, 1997.

Semester 5 : CS 506 – Computer Networks

Full Marks: 100

- Unit 1. Basic of computer networks: 25 marks  
Networking of computer-Advantages and disadvantages of computer networking  
Types of networks – LAN, MAN, WAN, Wireless  
Network Topology – Star, Ring, Bus, Tree, Complete, Irregular  
Reference Model – The OSI reference Model, the TCP/I P reference model.
- Telephone system: system, the local loops, trunks and multiplexing(FDM and TDM)  
Switching-circuit switching, message switching, Packet switching.
- Unit 2. Transmission Media : 25 marks  
Transmission media – Magnetic media, twisted pair, co-axial cable (base band and broadband), Fiber optics principle, transmission of light through fiber, fiber cables, fiber optics network, Comparison of fiber optic and copper wire. Wireless Transmission (The electromagnetic spectrum, Radio transmission, Microwave transmission, infrared and Millimeter waves, Light wave transmission).
- Unit 3. Data communication components : 25 marks  
Modem, routers, bridges, Hubs, Switches.  
Data link protocols:  
Asynchronous, Synchronous, Character Oriented and bit oriented protocols.
- Unit 4. IP Addressing : 25 marks  
IP address class, network and host addressing, subnet, subnet mask, subnetting, super netting.  
TCP/IP Protocol suite :  
Network Layer : IP protocol, address resolution protocol(ARP) , Reverse address resolution protocol (RARP), Internet control message protocol (ICMP) , internet group message protocol (IGMP).  
Transport Layer : user datagram protocol (UDP), transmission control protocol (TCP), case studies : (there is no weight age in examination),  
Application Layer : Bootstrap protocol (BOOP), Dynamic host configuration protocol (DHCP), Domain name system (DNS), telnet (terminal network), Hypertext transfer protocol (HTTP), file transfer protocol (FTP), trivial file transfer protocol (TFTP), *Simple* main transfer protocol (SMTP), Simple network management protocol (SNMP).

Text Book :

1. Computer Networks - A.S. Tanenbaum, 4<sup>th</sup> edition, PHI

References:

1. B.A. Forouzan - Data Communication and Networking – 4th Edition - TMH - 2007.
2. Jean Wairand - Communication Networks (A first Course) - Second Edition - WCB/McGraw Hill - 1998.

**Semester 5 : CS 507 - Data structures using C (Practical)**

**Full Marks: 100**

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
4. Implement add, delete operations of a queue using Arrays.
5. Implement add, delete operations of a queue using Pointers.
- 6 Implement stack using linked list.
7. Conversion of infix to postfix using stack .
8. Postfix Expression Evaluation.
9. Addition of two polynomials using Arrays and Pointers.
10. Creation, insertion, and deletion in doubly linked list.
11. Binary tree traversals (in-order, pre-order, and post-order) using linked list.
12. Depth First Search and Breadth first Search for Graphs using Recursion.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

**Semester 6 : CS 608 - Database Management Systems**

**Full  
Marks: 100**

- Unit 1. Introduction: 15 marks  
Characteristics of database approach, data models, database system architecture and data independence.
- Unit 2. Entity Relationship(ER) Modeling: 15 marks  
Entity types, relationships, constraints.
- Unit 3. Relational data model: 20 marks  
Relational model concepts, relational constraints, relational algebra, SQL queries, programming using embedded SQL.
- Unit 4. Database design: 15 marks  
Mapping ER model to relational database, functional dependencies, normal forms.
- Unit 5. Transaction Processing: 15 marks  
ACID properties, concurrency control, recovery.
- Unit 6. Case Study: 20 marks  
Oracle/MySQL

**Text Books :**

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education 2010.

**Reference books :**

1. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill 2002.
2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill 2010.



## Semester 6 : CS 609 - Operating Systems

Full Marks: 10

- Unit 1. Operating System 25 marks  
What is OS? Multiprogramming OS(Concurrent Processing System), Concepts of process & Threads, Concept of Interrupts, System Calls, OS is an interrupt driven system . Files, Shell, Introduction to shell programming.
- Unit 2. Structures of OS: 15 marks  
Monolithic, Layered, Virtual, Client Server and Distributed Model.
- Unit 3. Concepts of Synchronization: 10 marks  
Semaphores, Critical Regions, Monitor Inter Process Communication Mechanism.
- Unit 4. Processor Management: 10 marks  
Scheduling, Round-robin, Priority Queue.
- Unit 5. I/O management: 10 marks  
Device Management.
- Unit 6. Memory Management: 10 marks  
Multiprogramming, Swapping, Paging, Virtual memory, Page Replacement Techniques.
- Unit 7. File Systems: 10 marks  
Files and Directories, File Servers, Security and Protection.
- Unit 8. Dead Lock: 10 marks  
Definition, Detection and prevention.

Text book :

1. A. Silberschatz P.B.Galvin, Gange, "Operating System Concepts", 6th Edn., John Wiley & Sons., 2002.

Reference books :

1. H.M. Deitel, An Introduction to Operating System, Second Edition, Addison Wesley 1990.
2. A. S. Tanenbaum, Operating System Design and Implementation, PHI.

**Semester 6: CS 610 DBMS and Operating Systems Lab.**

**Full Marks: 100**

DBMS : SQL queries, Java programs to access database and execute queries. (50%)

Operation Systems : Process creation, Process termination, etc., program to demonstrate process synchronisation using semaphores, mutual exclusion, etc. (50%)



MANIPUR UNIVERSITY  
UNDERGRADUATE (B.Sc.) SEMESTER PROGRAMMES  
SYLLABUS

FOR

COMPUTER SCIENCE  
(B. Sc. Pass Course)

MANIPUR UNIVERSITY  
CANCHIPUR, IMPHAL – 795001

**FIRST YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
1 <sup>st</sup> Semester	CS 101	IT TOOLS & APPLICATIONS	60
	CS 101P	PRACTICAL	40
2 <sup>nd</sup> Semester	CS 202	PROBLEM SOLVING TECHNIQUES & PROGRAMMING IN C	60
	CS 202P	PRACTICAL	40

**SECOND YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
3 <sup>rd</sup> Semester	CS 303	DIGITAL COMPUTER DESIGN	60
	CS 303P	PRACTICAL	40
4 <sup>th</sup> Semester	CS 404	OBJECT ORIENTED PROGRAMMING IN JAVA	60
	CS 404P	PRACTICAL	40

**THIRD YEAR**

	CODE NO.	PAPER NAME	TOTAL MARKS
5 <sup>th</sup> Semester	CSP 505	DATA STRUCTURES USING C AND COMPUTER NETWORKS	60
	CSP 505P	PRACTICAL (DATA STRUCTURES USING C)	40
6 <sup>th</sup> Semester	CSP 606	DATABASE MANAGEMENT SYSTEMS AND OPERATING SYSTEMS	60
	CSP 606P	PRACTICAL (DBMS)	40

## Syllabus for B.Sc. Computer Science Elective (Ist Year)

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F I R S T Y E A R	Sem-I (July-Oct)	CS101 (Theory) IT Tools & Applications	Introduction to Computer	10
			MS-Windows	10
			MS-Words	15
			MS-Excels	15
			MS-PowerPoint	05
			Introduction to Internet	05
			Total Marks	60
		CS101P (Practical)	MS-Word	15
			MS-Excel	15
			MS-PowerPoint	5
	Introduction to Internet		5	
	Total Marks		40	
	Sem-II (Jan.Apr)	CS202 (Theory) Problem Solving Techniques & Programming in C	Techniques of Problem Solving	10
			C fundamentals	10
			Input Output Functions	10
			Functions	10
			Arrays	10
Pointers			10	
Total Marks			60	
CS202P (Practical)		Programming in C	40	
	Total Marks	40		

## Syllabus for B.Sc. Computer Science Elective (2<sup>nd</sup> Year)

Year	Semester	Paper	Topic	Marks
S E C O N D Y E A R	Sem-III (July-Oct)	CS303 (Theory) Digital Computer Design	Information Representation	10
			Binary Logic	10
			Digital Logic	20
			Combinational Circuits	20
			Total Marks	60
		CS303P (Practical)	Study of Logic Gates	10
			Implementation of Logic circuits	10
			Adder and Subtractor	20
			Total Marks	40
		Sem-IV (Jan.-Apr)	CS404 (Theory) Object Oriented Programming in Java	Introduction to Java
	Classes			20
	Packages			10
	I/O Streams			10
	Total Marks			60
CS404P (Practical)	Programming in Java		40	
	Total Marks	40		

## Syllabus for B.Sc. Computer Science Honours (3<sup>rd</sup> Year

Year	Semester	Paper	Topic	Marks	
H I R D  Y E A R	Sem-V (July-Oct)	CSP505 (Theory) Data structures using C and Computer Networks	UNIT -1	15	
			UNIT-2	15	
			UNIT-3	15	
			UNIT-4	15	
			Total Marks	60	
		CSP505P (Practical)	Data Structures using C	40	
			Total Marks	40	
		Sem-VI (Jan.-Apr)	CSP606 (Theory) Database Management Systems and Operating Systems	UNIT-1	10
				UNIT-2	10
				UNIT-3	10
	UNIT-4			10	
	UNIT-5			5	
	UNIT-6			5	
	UNIT-7			5	
UNIT-8	5				
Total Marks	60				
CSP606P (Practical)	DBMS and Operating Systems	40			
	Total Marks	40			

**Semester I : CS 101 - IT Tools and Applications****Full Marks: 60**

10 marks

**Unit 1. Introduction to Computer:**

Definition, Block Diagram along with its components, characteristics & classification of Computer.

Hardware (CPU, Primary and Secondary storage, I/O devices, Bus structure, Computer Peripherals - VDU, Keyboard, Mouse, Printer),

Software ( System and Application: Different System Software)

Programming Languages: Machine Language, Assembly Language, High Level Language, Object Oriented Language.

**Unit 2. MS Windows**

10 marks

An overview of different versions of windows.

The User Interface : The Desktop, My Computer, Recycle Bin, Status Bar, Taskbar, Start button and Menu selection, Title Bar, Control Panel, Icons on the screen.

Windows Explorer, Viewing of Files & Folders, Creating & Renaming of Files & Folders and shortcuts, Copy & Paste, Drag & Drop, Opening & Closing of files & folders.

**Unit 3. MS-WORD**

15 marks

Word processing concepts, Opening, Saving and Closing an existing document, moving around in a document, Manipulating Windows, various ways to select the text, insert & delete, moving and copying text, Proofing document with spell check and grammar check, auto-correct and auto-complete, Auto-text, borders and shading, Headers & Footers, Handling graphics, Creating charts & Tables, Mail merge.

**Unit 4. MS-EXCEL**

15 marks

Spreadsheet Concepts, Creating, Saving and Editing a Workbook, Inserting, Deleting Work Sheets, entering data in a cell/formula, Copying and Moving data from selected cells, Handling operators in Formulae, Functions: Mathematical, Logical, Statistical, Text, financial, Date and Time functions, Using function Wizard.

Formatting a worksheet: formatting cells-changing data alignment, changing date, number, character, or currency format, changing font, adding borders and colours, Charts and Graphs-Creating, Previewing, Modifying Charts.

**Unit 5. MS-POWERPOINT**

5 marks

Introducing PowerPoint, Building a presentation, Outlining the presentation, Creating a text slide, Creating chart slide, Formatting charts, Creating organisational charts & tables, Customizing a presentation, Drawing on slides, Creating slide shows.

**Unit 6. INTRODUCTION TO INTERNET**

5 marks

Basic internet terminology: World Wide Web, Browsers, E-mail, Search Engines.

Text book :

IT Tools and Applications ; Satish Jain, Shashank Jain, Shashi Singh and Dr. Madulika Jain, BPB Publications

Reference book :

S. Sagman, "Microsoft Office 2007 for Windows", Pearson Education



**Semester 1 - Practical I – CS 101P - IT Tools and Applications****Full Marks=****Sample problems for practical in MS-WORD****15 marks**

1. Perform the following operations by taking a simple text.
  - a) make a paragraph from the text bold-face, underline, italic
  - b) add a formula using subscript and superscript.
  - c) format a paragraph-left justified, right justified, centred
  - d) spacing the text – single, one-half and double.
  - e) select a part of the text & perform copy, cut & paste.
  - f) replace a word e.g. “IT” by “information Technology”.
  - g) insert page no./ some text in header & footer.
2. Prepare a simple Invitation Card using different fond styles & sizes and send it to 10 friends using Mail-merge technique.
3. Create a table to accommodate your name, class, roll number and marks.

**II. Sample problems for Practical in MS-EXCEL.****15 marks**

Create a spreadsheet corresponding to the following figures:

Student	Test1	Test2	Test3	Test4	Total	Wt. Average
Kanta	90	87	84	95	?	?
Surmala	89	79	78	92	?	?
Scni	93	88	68	79	?	?
Gobind	94	79	80	93	?	?
Test Average	?	?	?	?	?	?

- a) Calculate Wt. average using formula,  
Wt. average = (test1+test2+test3+test4)/4
- b) Calculate Total & Average for each test using spreadsheet function.

**III. Sample problems for Practical in MS-Power-point****5 Marks**

1. Create a presentation that consists of four slides, (minimum) on the following topics
  - a) Parts of a Computer
  - b) Advantages of Computer
  - c) Applications of computer

**IV. Sample problems for Practical in Internet.****5 Marks**

1. Opening of an e-mail account.
2. Searching a topic on the web using a search engine.

P 1

**Semester 2 : CS 202 - Problem Solving Techniques and Programming in C**  
**Full Marks: 60**

Unit 1. Techniques of Problem solving: 10 marks  
Concept of problem solving, problem definition, Flowchart, Algorithms, pseudo-code, structured programming concepts, programming methodologies viz. top-down and bottom up programming.

Unit 2. C fundamentals 10 marks  
Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

Unit 3. Data input output functions 10 marks  
Simple C programs - Flow of control - if, if-else, while, do-while, for Loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.

Unit 4. Functions 10 marks  
Definition proto-types - Passing arguments(including command line argument) - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.

Unit 5 . Arrays and structures 10 marks  
Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

Unit 6. Pointers and File 10 marks  
Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files : creating, opening, reading, writing and closing a file.

Text Books :

1. E. Balagurusamy, Programming in Ansi C, 4<sup>th</sup> Edition.

References:

1. B.W. Kernighan and D M.Ritchie, The C Programming Language, 2nd Edition, PHI, 1988.
2. Gottfried,B.S, Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.
3. Computer Oriented Numerical Methods, V. Rajaraman, PHI.

## Semester 2 - Practical II – CS 202P - Problem Solving Techniques and Programming in C

Full Marks: 40

### I. Sample Programs for practical C:

- Write a C program to exchange the values of the two variables without using a third Variable
- Write a C program to convert a temperature from one unit to another say Celsius to Fahrenheit.
- Write a C program to calculate the Compound interest accepting the necessary data from the keyboard.
- Write a C program to generate natural numbers up to n term.
- Write a C program to find the sum of n natural numbers.
- Write a C program to generate the first 10 even numbers and also find its sum.
- Write a C program to generate the first 10 odd numbers and also find its sum.
- Write a C program to find the HCF and LCM of two/three numbers.
- Write a C program to find the mean of n numbers.
- Write a C program to compute the standard deviation from a list of numbers.
- Write a C program to generate Prime numbers up to n terms
- Write a C program to find Factorial of a number.
- Write a C program to generate Fibonacci series of number up to n term.
- Write a C program to generate Fibonacci numbers between 1 and N using recursion, N being a natural number.
- Write a C program to reverse the digits of a given positive number using recursion.
- Write a C program to find the addition of 2 matrices.
- Write a C program to find multiplication of 2 matrices.
- Write a C program to find the length of a string and arrange the string in ascending order.
- Write a C program to count the number of characters, vowels, consonants and digits in a text line.
- Write a C program to arrange the accepted numbers in ascending order and descending order.
  
- Write a C program to find the maximum & minimum from a given list of numbers.
- Write a C program that will read a positive no. from the keyboard and checks whether the no. is prime or not.
- Write a C program to find the sum of digits of an integer reducing it to a single digit.
- Write a C program to check whether a string is a palindrome.
- Create a file of records where the structure of each record is as follows : Name, Basic Pay, DA(37% of Basic Pay).
- Read the file created in the preceding question.
  
- Create a file of records where each records should contain the following fields : Name, Rollno, Mk1, Mk2,....., Mk6.
- Read the file created in the preceding question and Calculate the PC of each student.
- Write a C program using command line arguments to calculate the circumference of a circle whose radius is 5 cm.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

**Semester 3 : CS 303 - Digital Computer Design****Full Marks: 60**

- Unit 1. Information Representation: 10 marks  
Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode
- Unit 2. Binary Logic: 15 marks  
Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.
- Unit 3. Digital Logic: 20 marks  
Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.
- Unit 4. Combinational Circuits: 15 marks  
Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

**Text Books**

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

**Reference Books**

1. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill
3. Digital Principles and Applications, A.P. Malvino and D. Leach, Tata Mckraw Hill.

**Semester 3 – CS 303P - Digital Computer Design ( Practical)****Full Marks: 40****I: Study of Logic Gates**

10 Marks

1. Logic Gates using discrete components.
2. Verification of truth table for AND, OR, NOT, NAND, NOR and XOR gates.
3. Realisation of NOT, AND, OR, EX-OR gates with only NAND gates.
4. Realisation of NOT, AND, OR, EX-OR gates with only NOR gates.

**II Implementation of Logic circuits**

10 Marks

1. Verification of Associative law for AND, OR gates.
2. Karnaugh's Map reduction and logic circuit implementation.

**III: Adder and Subtractor**

20 Marks

1. Verification of Demorgans Law.
2. Implementation of Half- Adder and Half- Subtractor or.
3. Implementation of Full-Adder and Full Subtractor or.
4. Four bit binary Adder.
5. Four bits binary subtractor using 1's and 2's complement.

**Semester 4 : CS404 - Object Oriented Programming in Java****Full Marks: 60****Unit 1. Introduction to Object Orientation Approach**

10 Marks

History and evolution of Object Oriented Languages.

OOPs features : Encapsulation, Data Abstraction, Inheritance, Multiple Inheritance, Polymorphism, Message Passing, Extensibility, Persistence, Delegation, Genericity.

**Unit 2. Introduction to Java**

10 Marks

Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements.

**Unit 3. Classes**

20 Marks

Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super- Abstract class.

**Unit 4. Packages**

10 Marks

Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading.

**Unit 5. I/O Streams**

10 Marks

File Streams - Applets - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation.

**Reference books :**

1. Cay S. Horstmann, Gary Cornell - Core Java 2 Volume I - Fundamentals, 5th Edn. PHI, 2000.
2. P. Naughton and H. Schildt - Java2 (The Complete Reference) - Third Edition, TMH 1999.

3. K. Arnold and J. Gosling - The Java Programming Language - Second Edition, Addison Wesley, 1996.

**Semester 4 : CS 404P - Object Oriented Programming in Java (Practical)**

Full Marks: 40

- Write a Java program to generate natural numbers up to n term.
- Write a Java program to generate the first 10 even numbers and also find its sum.
- Write a Java program that will read a positive no. from the keyboard and checks whether the no. is prime or not.
- Write a Java program to find Factorial of a number.
- Write a Java program to find the maximum & minimum from a given list of numbers.
- Write a Java program to find the addition of 2 matrices.
- Write a Java program to find multiplication of 2 matrices.
- Write a Java program to implement bubble-sort.
- Write a Java program to find the sum of digits of an integer reducing it to a single digit.
- Write Java programs related to
  - Class and Objects.
  - Constructor and Operator overloading
  - Inheritance.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

**Semester 5 : CSP 505 - Data structures using C and Computer Networks**

**Full Marks: 60**

15 marks

UNIT 1. Definition of Data structures, primitive and composite data types, arrays, operations on arrays, order lists, stack, queues, linked list, implementation of stack using arrays and linked list, application of stack(Infix to Postfix Conversion), singly linked list operations, applications of singly linked list (representation of a polynomial, polynomial addition), doubly linked list- operations.

15 marks

UNIT 2. Binary trees, operations-tree traversals; Graph- definition, types of graphs, graph traversals – Shortest path, Dijkstra's algorithm. Searching techniques – linear, binary; Sorting – bubble, insertion, selection, merge.

15 marks

UNIT 3. Introduction to Computer Communications and Network Technologies; Use of Computer Networks; Network devices, Nodes and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-oriented and connectionless Services; Network Applications and Application protocols; computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server model, Peer-to-Peer Model, Web-Based Model, Network Architecture and OSI Reference Model; Example Networks: The Internet, Frame Relay, ATM.

15 marks

UNIT 4. Intranet and Internet; Servers and Clients; Ports; Domain Name Server (DNS); IP addressing, WWW, Browsers, Social Networking, E-mail, Chatting, Voice and Video Conferencing.

Text Book :

1. Data structure using C and C++ : Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum , Second Edition, Pearson Prentice Hall.
2. Computer Networks - A.S. Tanenbaum, 4<sup>th</sup> edition, PHI

References:

1. E.Horowitz and S. Shani Fundamentals of Data Structures in C, Galgotia Pub. 1999.
2. Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.
3. R. Kruse C.L. Tondo and B. Leung, Data Structures and Program design in C, PHI, 1997.
4. B.A. Forouzan - Data Communication and Networking – 4th Edition - TMH - 2007.

5. Jean Wairand - Communication Networks (A first Course) - Second Edition - WCB/McGraw Hill - 1998.



**Semester 5 : CSP 505P - Data structures using C (Practical)****Full Marks: 40**

1. Implement PUSH, POP operations of stack using Arrays.
2. Implement PUSH, POP operations of stack using Pointers.
3. Implement add, delete operations of a queue using Arrays.
4. Implement add, delete operations of a queue using Pointers.
5. Implement stack using linked list.
6. Conversion of infix to postfix using stack .
7. Postfix Expression Evaluation.
8. Addition of two polynomials using Arrays and Pointers.
9. Creation, insertion, and deletion in doubly linked list.
10. Binary tree traversals (in-order, pre-order, and post-order) using linked list.
11. Depth First Search and Breadth first Search for Graphs using Recursion.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.

**Semester 6 : CSP 606 - Database Management Systems and Operating Systems**  
**Full Marks: 60**

UNIT 1. Database system concepts and Architecture: 10 marks

Basic concepts of Databases and database management system, characteristics of the database approach, brief history of database applications, categories of Data Models, Three-schema Architecture and Data independence, DBMS languages, component modules and their interactions, Two-Tier client/server architectures, Three-Tier and n-Tier architectures for web applications and classification of DBMS.

UNIT 2. Entity-Relationship Modeling, Relational Data Model and Constraints 10 marks

Concepts of Entity types, Attributes, keys, Relationship types, constraints (cardinality ratio and participation), UML class diagrams. Concepts of Relations, Domains, attributes, tuples, characteristics of relations, domain constraints, key constraints, constraints on null values, Entity Integrity, referential integrity and foreign keys, triggers and assertions, insert, delete and update operations, Online Transaction Processing.

UNIT 3. Relational Algebra, Queries, Functional Dependencies and Normal forms 10 marks

Select, Project, Rename, union, intersection and minus operations, Binary relational operations: Join and Division, Equijoin, Natural join, outer join, aggregate functions and grouping and examples of queries. Inference rules for Functional Dependencies, Normal Forms-1NF, 2NF, 3NF and BCNF.

UNIT 4. Operating System and its Structure: 10 Marks

What is OS? Multiprogramming OS (Concurrent Processing System), concept of process & Threads, Concept of Interrupts, System Calls, OS as an interrupt driven system. Files, Shell, Introduction to shell programming, Virtual Client Server and Distributed Model.

UNIT 5. Concepts of Synchronization: 5 Marks

Semaphores, Critical Regions, Monitors Inter Process Communication Mechanism

UNIT 6. Process Management: 5 Marks

Scheduling, Round-robin, Priority Queue.

UNIT 7. I/O management: 5 Marks

Device Management.

UNIT 8. Memory Management: 5 Marks

Multiprogramming, Swapping, Paging, Virtual memory, Page Replacement Techniques.

**Text Books :**

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education 2010.
2. A. Silberschatz P.B. Galvin, Gange, "Operating System Concepts", 6<sup>th</sup> Edn., John Wiley & Sons., 2002

**Reference books :**

1. R. Ramakrishnan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill 2002.

2. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill 2010.
3. H.M.Deital, An Introduction to Operating System, Second Edition , Addison Wesley, 1990
4. A.S. Tanenbaum , Operating System Design and Implementation, PHI.

**Semester 6: CSP 606P (DBMS )****Full Marks: 40**

- Q1. Create a table *sinfo* having the columns *rollno*, *name*, *address*, *age* and enter some meaningful records. Find the youngest student.
- Q2. Create a table *sinfo* having the columns *rollno*, *name*, *address*, *age* and enter some meaningful records. Change the name of all the students whose name starts with 'm' to 'M'.
- Q3. Create a table *sinfo* having the columns *rollno*, *name*, *address*, *age* and enter some meaningful records. List out all the students whose name contains the letter 'r' or 'R'.
- Q4. Create a table *sinfo* having the columns *rollno*, *name*, *address*, *age* and enter some meaningful records. Delete or remove the record of the student whose roll no is 5120.
- Q5. Create a table *sinfo* having the columns *rollno*, *name*, *address*, *age* and enter some meaningful records. Retrieve all distinct marks for each student.
- Q6. Create a table *employee* having the columns *empno*, *name*, *address*, *salary*, *dept* and enter some meaningful records. List out all the employees whose monthly income is greater than Rs. 30000 and less than Rs. 50000.
- Q7. Create a table *semmployee* having the columns *empno*, *name*, *address*, *salary*, *dept* and enter some meaningful records. Find out all the employees whose address is 'Canchipur'.
- Q8. Create a table *student* having the columns *rollno*, *name*, *address*, *exam\_attendance* and enter some meaningful records. Retrieve the name of all the students who are absent from appearing examination.

N.B. : The programs given here are instructional in nature and are meant for providing a broad guideline in conducting practicals and framing questions.