

Computer Fundamentals

Objective: *To impart basic introduction to computer hardware components, computer numbering, how the CPU works, fundamental about algorithms and flowchart as well as different type of software.*

Sr. No	Topic	Ref.	No. of Lect.
1.	Fundamentals of Computer System		3
	<ul style="list-style-type: none"> • Introduction. • Characteristics & features of Computers. • Components of Computers. • Organization of Computer. 	1/1	
2.	Data Representation		12
	<ul style="list-style-type: none"> • Introduction to Number System <ul style="list-style-type: none"> ○ Decimal Number System ○ Binary Number System ○ Hexadecimal Number System • Conversion within Numbers Systems • Arithmetic Operation on Binary and Hexadecimal Numbers • Normalized Floating point Number • Representation of Character in Computers • Representation of Integer Numbers • Representation of Fraction Numbers • Hexadecimal Representation of Number 	1/3	4
		1/3	4
		2/2	4
3.	Algorithm and Flowcharts		6
	<ul style="list-style-type: none"> • Algorithm <ul style="list-style-type: none"> ○ Definition ○ Characteristics ○ Advantages and disadvantages ○ Examples • Flowchart <ul style="list-style-type: none"> ○ Definition ○ Define symbols of flowchart ○ Advantages and disadvantages ○ Examples 	2/1	3
		3/3	3
		3/4	
4.	Computer Generation & Classification		3
	<ul style="list-style-type: none"> • Generation of Computers : First to Fifth • Classification of Computers • Distributed & Parallel computers 	2/12	
5.	Computer Languages		3
	<ul style="list-style-type: none"> • Types of Programming Languages <ul style="list-style-type: none"> ○ Machine Languages ○ Assembly Languages ○ High Level Languages • Assembler, Linker, Loader, Interpreter & Compiler. 	2/9	
		2/9	

6. Computer Memory		3
• Memory Cell & Organization	2/4	
• Types of Memory (Primary And Secondary)	2/4	
○ RAM		
○ ROM		
○ PROM		
○ EPROM		
○ Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT)		
7. I/O Devices		3
• Input Devices :	1/4	
○ Touch screen , OMR, OBR , OCR, Light pen		
• Output Devices :	1/4	
○ Scanners, Digitizers, Plotters, LCD		
○ Plasma Display, Printers		
8. Processor		6
• Structure of Instruction	2/5	
• Description of Processor		
• Processor Features		
• RISC & CISC		
9. Operating system Concepts		6
• Why Operating System	2/10	2
• Functions of Operating System		
• Types of Operating System	2/10	4
○ Batch O.S.		
○ Multiprogramming O.S.		
○ Time Sharing O.S		
○ Personal Computers O.S.		
○ Network O.S.		

Core Reference:

1. Fundamentals of Information Technology
By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers
By V.Rajaraman, PHI Publication , IVth Edition.
3. Fundamentals of Programming
By Raj K.Jain, S.Chand Publication

Additional Reference:

1. Computer Today
By Suresh K. Basandra, Galgotia Publication, Updated Edition
2. Computer Fundamental
By B.Ram, BPB Publication.

Digital Electronics.

Objective: To impart basic knowledge in digital logic and circuits and to introduce basic concepts of data communications. Student will be able to learn basic concepts of digital logic and the design of basic logic circuits using commonly used combinational and sequential circuits

Sr. No	Topic	Ref.	No. of Lect.
1	Number Systems and Arithmetic	1/1	10
	Decimal Number System & Binary Number System		1
	Decimal to Binary conversion(Double-dabble method only)		1
	Binary to Decimal Conversion		1
	Binary Arithmetic : Binary addition, subtraction, multiplication & division		2
	Hexadecimal number system , Hexadecimal to binary, binary to Hexadecimal, Hexadecimal to decimal conversion		2
	Hexadecimal arithmetic: Addition, subtraction, multiplication & division		2
	Binary subtraction using 1' complement, 2's complement method		1
2	Boolean Algebra and Logic Gates	1/3	7
	Postulates of Boolean Algebra		1
	Theorems of Boolean Algebra: Complementation , commutative, AND, OR, Associative,Distributive,Absorption laws , De morgan's theorems		2
	Reducing Boolean expressions		1
	Logic Gates : AND, OR, NOT, Ex-OR, Ex-NOR		1
	NAND as Universal building block		1
	Logic diagrams of Boolean expressions Boolean expressions for logic diagrams		1
3	Minimization Techniques	1/5	5
	Introduction , Minterms and Maxterms		1
	K-Map, K-map for 2 variables		1
	K-map for 3 variables		1
	K-map for 4 variables		2
4	Combinational and Arithmetic Logic Circuits	1/6	7
	Half Adder & Full Adder		1
	Binary parallel Adder		1
	Half Subtractor, Full Subtractor		1
	Adder/Subtractor in 2's complement system		1
	BCD to Decimal decoder		1
	2 : 4 demultiplexer		1
	4 line to 1 line multiplexer		1

5	Flip Flops	1/7	6
	Introduction : RS FF		1
	Clocked RS FF, D FF		1
	Triggering, preset and clear		1
	JK FF , T FF , Race around condition		2
	Master slave FF		1
6	Counters	1/8	7
	Introduction : Asynchronous/ ripple counter		1
	Modulus Counter , MOD-12 counter		1
	Synchronous counter : Synchronous serial & synch parallel counter		2
	BCD counter		1
	Ring counter		1
	Johnson counter		1
7	Shift Registers	1/9	3
	Introduction, Buffer register		1
	Serial- in serial -out Serial-in parallel-out		1
	Parallel-in serial-out, parallel-in parallel-out		1

Core Reference:

1. Digital Electronics and Micro-Computers – R.K.Gaur , Dhanpat Rai Publication

Additional Reference:

1. Digital Electronics and Logic Design – N.G.Palan, Technova Publication

8085:Microprocessor

Objective: *To introduce 8085 assembly language and thereby familiarize the student with architecture of microprocessors.*

Sr. No	Topic	Ref.	No. of Lect.
1.	Microprocessor, Microcomputers and Assembly language	1/1	5
	• Microprocessors		2
	• Microprocessor Instruction set and computer languages		2
	• From large Computers to Single chip microcontrollers		1
2	Building Concept of Microprocessor	2/3	3
	• Introduction , Study of human body		1
	• Memory, input, output devices		1
	• Central processing unit		1
3	8085 Microprocessor	2/4	6
	• Features of intel 8085 microprocessor		1
	• Pin diagram and pin functions of 8085		2
	• 8085 CPU architecture		1
	• Functions internal blocks		2
4	Introduction to 8085 Assembly Language Programming	1/5	5
	• The 8085 programming model		1
	• Instruction Classification		1
	• Instruction and Data formats		2
	• How to write assembly and execute simple programs		1
5	8085 Instruction Set-I	2/6	5
	• Addressing Modes		1
	• Classification of Instruction set		1
	• Data Transfer group of Instructions		2
	• Program examples for data transfer group		1
6	8085 Instruction Set-II	2/6	9
	• Arithmetic instructions group		3
	• Program examples		2
	• Logical instruction group		3
	• Program examples		1
7	8085 Instruction Set-III	2/6	6
	• Conditional and unconditional Jump		2
	• Conditional and unconditional CALL		2
	• Conditional and unconditional RET		2

8	Concept of Looping	2/6	6
	• Flowchart		1
	• Programs using loop : Examples		3
	• Stack and Machine control group		2

Core Reference:

1. Microprocessors : Architecture, programming and Applications with 8085–
By R.S.Gaonkar.
2. 8- it Microprocessors –
By V.J.Vibhute, P.B.borole

Programming in C

Objective: To expose students to algorithmic thinking and problem solving and impart moderate skills in programming using C Language in a industry-standard. Introduce students to learn basic features, Create, execute simple C programs using conditional statements, loops and arrays.

Sr. No	Topic	Ref.	No. of Lect.
1.	Introduction <ul style="list-style-type: none"> An Overview of C , History of C language, C as a Structured Language, Features of C. 	2/1, 1/1,	3
2.	Basic Elements & Operators <ul style="list-style-type: none"> Character set, C Token, Identifier & Keywords, Variables Constant and its types. Integer constant, floating point constant, character constant, string constants. Operators: Arithmetic, Relational, Logical, Unary operators: Increment & decrement Assignment and Conditional operator. Precedence & Associativity of Operators 	2/2,3, 1/1	6
3.	Data Types <ul style="list-style-type: none"> Data Types: <i>int, char, float, double</i>. Declaration & Initialization. Type modifiers: long, short, signed and unsigned 	2/2, 1/1, 1/6	3
4.	C Program & I/O statements <ul style="list-style-type: none"> Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input/Output function: <i>scanf & printf</i>, Escape sequence characters. Library functions: General used & Mathematical. 	2/4, 2/3, 1/1	3
5.	Control and Iterative Statements : <ul style="list-style-type: none"> Simple if, nested if, if-else, else if ladder Switch-case statement The conditional expression (? : operator) <i>while</i> and <i>do-while</i> loop, and <i>for</i> loop <i>break & continue</i> statement, <i>goto</i> statement 	2/5, /6, 1/3, 1/4	12
6.	Arrays: <ul style="list-style-type: none"> Introduction, Declaration and initialization Accessing array elements, Memory representation of array. One dimension and multidimensional arrays, character array, Introduction to string 	2/7, 2/8, 1/8, 3	9

7. Functions

2/9, 1/5, 3

6

- Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.

Core Reference:

1. Let us C : Y.P. Kanetkar [bpb publication]
2. Programming in C : E. Balaburuswamy [Tata macgraw hill]
3. Programming in C : Goterfried [Shaums' Series]

Additional References:

1. Spirit of "C" : Moolish Kooper.

Communication Skill

Objective: To equip students of computer science with effective speaking and listening skills in English To help them develop their soft skills and people skills, which will make the transition from college to workplace smoother and help them to excel in their jobs. & to enhance students' performance at Placement Interviews, Group Discussions and other recruitment exercises.

Sr. No	Topic	Ref.	No. of Lect.
1.	Concept of Communication <ul style="list-style-type: none"> • Attributes of Communication • Process of Communication • Feedback 	1/1	3
2.	Objective of Communication <ul style="list-style-type: none"> • Upward Communication • Downward Communication • Horizontal Communication 	1/2	3
3	Method of Communication <ul style="list-style-type: none"> • Verbal , Oral , Written 	1/3	3
4	Written Communication <ul style="list-style-type: none"> • Punctuation marks, Capitals, Abbreviations • Grammer: Parts of Speech, tenses, vocabulary building, reduction of sentence length, summarization, constructing paragraphs. • CS of good communication • Language of business writing 	1/11 1/12	12
5	Oral Communication <ul style="list-style-type: none"> • Speeches and Presentation • Dialogues 	1/29 1/30	9

English Language Lab (15 Periods)

1. **Listening Comprehension** (4)
Listening and typing – Listening and sequencing of sentences – Filling in the blanks – Listening and answering the questions
2. **Reading Comprehension and Vocabulary** (5)
Filling in the blanks - Cloze Exercises – Vocabulary building – Reading and answering questions.
3. **Speaking:** (6)
Phonetics: Intonation – Ear Training – Correct Pronunciation – Sound recognition exercises -Common Errors in English
Conversations: Face to Face Conversation - Telephone conversation – Role play activities (Students take on roles and engage in conversation)

Core Books

1. Business Communication , By urmila Rai & S.M.Rai. Himalaya Pub.
2. Communication Skill for Effective Management By Dr.Anjali Ghanekar. Everest Pub. House.
3. Developing Communication Skill By Krishna Mohan, Meera Banerji. McMillan

Mathematical Foundation

Objective: Main objective of this course is to introduce mathematical concepts and techniques that have applications in computer science and Information Technologies.

Sr. No	Topic	Ref.	No. of Lect.
1.	Set Theory	1/1,2/1	13
	<ul style="list-style-type: none"> • Basic Definitions: Set, Finite set, Infinite set, Singleton Set, Empty set, Subset, Proper Subset, Universal set, Power set, Venn diagram. • Combinations of Sets: Union of sets, Intersection of Sets, Complement of a set, Equality of two sets, Disjoint sets, Difference of two sets, Symmetric Difference, Cartesian Product; explanation of each using Venn-diagram and simple examples. • Rules of Set Theory. • Algebraic Properties of Set Operations: Statement and proof of Commutative Laws, Associative Laws, Distributive Laws, Idempotent Laws, Properties of Compliment, Properties of Universal set, Properties of Empty set, Principal of Inclusion and Exclusion 		1 2 1 9
2.	Permutation and Combination	1/3,2/3	14
	<ul style="list-style-type: none"> • Permutation: The Multiplication Principal of Counting, Counting Methods • Combination: Theorems and Examples. • Pigeonhole Principal without proof, Examples. • Probability: Sample Spaces, Events, Assigning Probabilities to Events, Equally Likely Outcomes. 		3 3 2 6
3.	Relation and Function	2/4	9
	<ul style="list-style-type: none"> • Introduction: Binary Relation, Tabular Form, Graphical Form, Ternary Relation, Quaternary Relation. • Properties of Binary Relations: Reflexive Relation, Symmetric Relation, Antisymmetric Relation, Transitive Relation, Transitive Closure. 		3 6
4.	Boolean Algebra	2/12	9
	<ul style="list-style-type: none"> • Lattice: Introduction, Sublattices , Properties of Lattices, Distributive and Complimented Lattices • Principle of Duality. 		

Core Reference:

[1] “Discrete Mathematical Structures” by Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Pearson Education Asia.

[2] “Elements of Discrete Mathematics” by C.L. Liu, Tata McGraw-Hill

Additional Reference:

[3] “Discrete Mathematics” by Dr. Bembalkar.

Office Lab

Objective: To impart the student hands on practice so that students should be able to: *Create, Save, Copy, Delete, Organize various types of files and manage the desk top in general, use a standard word and spread-sheet processing package exploiting popular features.*

- **GUI Operating System** : Mouse Practice, Starting, Login, Shutdown, Exploring Directories, Resizing, Moving, Minimizing, closing of software windows, familiarization with file icons, Launching Applications, Deleting, Renaming files, Managing Directories, Searching for files, Using Accessories.
- **Web Browser:** Basic Browsing, Buttons: forward, backward, home, adding to favorites, stop, save, save as, Saving an Image from the Web, printing, Specifying a Home Page, **Browsing:** Using Web URLs, Anatomy of a URL, Membership Websites: Signing up for email service, **Searching:** Academic Search on the web.
- **Word Processing Tool:** Menus, Shortcut menus, Toolbars, Customizing toolbars, Creating and opening documents, Saving documents, Renaming documents, Working on multiple documents, Close a document ; **Working With Text** :Typing and inserting text, Selecting text, Deleting text, Undo, Formatting toolbar, Format Painter, Formatting Paragraphs: Paragraph attributes, Moving, copying, and pasting text, The clipboard, Columns, Drop caps; **Styles** : Apply a style, Apply a style from the style dialog box, Create a new styles from a model, Create a simple style from the style dialog box, Modify or rename a style, Delete a style; **Lists** : Bulleted and numbered lists, Nested lists, Formatting lists **Tables** :Insert Table button, Draw a table, Inserting rows and columns, Moving and resizing a table, Tables and Borders toolbar, Table properties **Graphics** :Adding clip art, Add an image from a file, Editing a graphic, AutoShapes; **Spelling and Grammar:** AutoCorrect, Spelling and grammar check, Synonyms, Thesaurus; **Page Formatting:** Page margins, Page size and orientation, Headers and footers, Page numbers, Print preview and printing.
- **Spreadsheet Basics:** Screen elements, Adding and renaming worksheets, The standard toolbar - opening, closing, saving, and more; **Modifying A Worksheet,** Moving through cells, Adding worksheets, rows, and columns, Resizing rows and columns, Selecting cells, Moving and copying cells,, Freeze panes; **Formatting Cells:** Formatting toolbar, Format Cells dialog box, Dates and times; **Formulas and Functions:** Formulas, Linking worksheets, Relative, absolute, and mixed referencing, Basic functions, Function Wizard, Autosum, **Sorting and Filling:** Basic ascending and descending sorts, Complex sorts, Autofill; Alternating text and numbers with Autofill, Autofilling functions; Graphics; Adding clip art; Add an image from a file; Editing a graphics; AutoShapes; **Charts:** Chart Wizard; Resizing a chart; Moving a chart, Chart formatting toolbar; **Page Properties and Printing:** Page breaks, Page orientation, Margins, Headers, footers, and page numbers, Print Preview, Print; Keyboard Shortcuts.

- **Presentation Tool:** AutoContent Wizard, Create a presentation from a template, Create a blank presentation, Open an existing presentation, AutoLayout, Presentation Screen: Screen layout, Views, Working with Slides: Insert a new slide, Applying a design template, Changing slide layouts, Reordering slides, Hide slides, Create a custom slide show, Edit a custom slide show Adding Content: Resizing a text box, Text box properties, Delete a text box, Bulleted lists, Numbered lists, Adding notes, Video and Audio Working with Text: Adding text, Editing options, Formatting text, Replace fonts, Line spacing, Change case Spelling check Color & Background: Color schemes, Backgrounds, Graphics, Adding clip art, Adding an image from a file, Editing a graphic, AutoShapes, WordArt Slide Effects: Action buttons, Slide animation, Animation preview, Slide transitions, Slide show options, Master Slides, Slide master, Header and footer, Slide numbers, Date and time Saving and Printing, Save as a web page, Page setup, Print
- **Integrating Programs** Word, spreadsheet and Presentation.

Note:

The above practical is to be conducted using the either Microsoft-Office or OpenOffice.

Digital Electronics Lab

Objective: *To provide hands-on practice of the basic knowledge in digital logic and circuits and to provide hands-on practice in some commonly used combinational and sequential circuits*

Instruction: The Laboratory work will have to be performed during the semester consisting of any of the 8 experiments from the given list below:

List of Experiments:

1. Study and Testing of measuring instruments: Digital and Analog multimeters, CROs and Signal Generators – measurement of AC & DC voltages, measurement of frequency.
2. Study of Components: Identification and testing of resistors, capacitors, inductors, diodes, LEDs & transistors
3. Study of Logic Gates: Study of truth table of basic gates, realization of Boolean functions
4. Study of Half adder and Full Adder
5. Study of Half Subtractor and Full Subtractor
6. Study of Implementation of a 3:8 decoder,
7. Study of 4-line to 16 bit decoder
8. Study of BCD to 7-segment decoder
9. Study of Generating a Boolean expression with a multiplexer
10. Study of Clocked JK Flip Flop
11. Study of 4-bit ripple counter
12. Study of Parallel-in, serial-out, 4-bit shift register

8085: Microprocessor

Instruction: Any ten experiments from the list given below are to be performed on the 8085 Microprocessor Kit:

1. Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8085.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
5. Block transfer and block exchange of data bytes.
6. Finding the smallest and largest element in a block of data.
7. Arranging the elements of a block of data in ascending and descending order.
8. Generating delays of different time intervals using delay subroutines and measurement of delay period on CRO using SOD pin of 8085.
9. Program for Summation of First n Number.
10. Program for Factorial of n.
11. Program for Addition of Array elements.
12. Program for Reversing the Array elements.
- 13.

Lab for Programming in 'C'

List of Experiments:

1. Find Area, Perimeter of Triangle & Rectangle.
2. Find maximum amongst 3 numbers.
3. Program for nested loops.
4. Program to Calculate x^y
5. Program to check Prime Number.
6. Program to find Armstrong Number.
7. Program to print the Fibonacci Series
8. Searching and element from array.
9. Transpose of matrices
10. Multiplication of matrices
11. Sorting array using bubble sort technique
12. Program for recursion e.g. factorial, reverse of digit
13. Program for structure initialization
14. Array of Structure e.g. student result, Employee pay slip , Phone bill
15. Function with parameter & return values

Introduction to Data Structure

Objective: *This course provides students an opportunity to develop and refine their programming skills. In particular, the emphasis of this course is on the organization of information, the implementation of linear data structures such as arrays, lists, stacks, queues, and techniques of data abstraction, including searching and sorting.*

Sr. No	Topic	Ref	No. of Lect.
1.	Introduction to Data Structure:		3
	• Introduction		1
	• Basic Terminology : Data item, Fields, Records, Files, Entity, Attributes		1
	• Data Organization and Data Structure		1
2.	Arrays		9
	• Representation of Linear Arrays		1
	• Traversing, Insertion and Deletions		3
	• Sorting & Searching Algorithms		2
	• Multidimensional Arrays : 2D & M-D Concept		1
	• Record : Record Structures, Representation in Memory		2
3	Linked List		15
	• Concept of Linked List		1
	• Representation of linked List in memory		1
	• Traversing a linked list		3
	• Searching a linked list : sorted and unsorted		3
	• Insertion & Deletion in Linked List		7
	• Header Linked List & Two way List		2
4	Stacks, Queues , Recursion		12
	• Stack: Operation , Array Representation of Stack, 1 representation of stack, Arithmetic Expression POLISH & POSTFIX, Application of stacks: Quicksort, Recursion.		6
	• Queue : Representation of queues, linked representation of queues		3
	• Types of Queues : Deques & Priority Queues		3

Core References:

1. Data Structures : By Seymour Lipschutz, Tata Mcgraw- Hill Publication.

Advance Reference:

1. Fundamentals of Data structures, by Horowitz and Sahani (Galgotia publications).
2. An introduction to data structures and application, by Jean Paul Tremblay & Pal G. Sorenson (McGraw Hill).
3. Data Structures, by Tannenbaum, (PHI).

Operating Systems

Objectives: To introduce students the basic functioning of operating systems as resource manager and its Salient features. Also to study about process states, scheduling, Memory and I/O Management techniques.

Sr. No	Topic	Ref	No. of Lect.
I	Introduction to Software:		2
	<ul style="list-style-type: none"> Software: Definition, classification and components of software, operating system as the main component of system software; 		2
II	Operating System Fundamental	2/1	7
	<ul style="list-style-type: none"> Operating Systems: OS as a resource manager, Structure of OS, Evolution of OS, OS functions, Characteristics of modern OS. Types of O.S.: Early systems, simple batch systems, multi-programmed batch systems, Time sharing system, Personal Computer systems, Parallel systems, Distributed systems, Real time systems OS Structures: Components of OS: Process management, Memory management, Storage management, File management, I/O management. 		2 3 2
III	Process Management	1/2	18
	<ul style="list-style-type: none"> Concept of Process: Process State, Operation on Processes, thread. CPU Scheduling : Types of Schedulers, Criteria for scheduling, Scheduling Algorithms. Process Synchronization: Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization. Deadlocks: Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock 		3 5 5 5
IV	Storage Management	1/3	12
	<ul style="list-style-type: none"> Memory Management: Address Binding, Logical Vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium. Virtual Memory: Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windowsXp. File System Interface: Files, File Access, Directory Structure, Protection Implementation of File System: Allocation Methods, Free space Management 		4 4 2 2

V	I/O System	1/4	6
	• I/O System Components : I/O Devices , I/O Hardware , Application I/O interface		3
	• Secondary Storage Structure : Disk fundamental, Disk Scheduling , Disk Management		3

Core References:

1. “Operating System”, By S.R.Sathe & Anil S.Mokhade , MacMillan Publication.
2. “Operating System”, By Stuart E.Madnick, John J.Donovan.

Additional References:

1. Operating System Concepts- A. Silberzchaz & P.B. Galvin, Addison – Wesley Publishing Company.

8086: Microprocessor

Objectives: *Make the student aware about the functional organization of physical components and architecture of a 8086 Microprocessor Kit. Also give the brief about instruction set of 8086.*

Sr. No	Topic	Ref	No. of Lect.
1.	Introduction to Microprocessor and Microcomputer	1/1	
	• Historical background		1
	• Microprocessor based personal computer system		2
	• Number system		2
	• Computer data formats		1
2	8086 Hardware specification		1
	• Types of computers		2
	• Microcomputer structure and operation		3
	• 8086 internal architecture		1
	• Introduction to programming 8086 : programming languages		
3	Addressing Modes	1/3	
	• Data addressing modes		4
	• Program memory addressing modes		2
	• Stack memory addressing modes		1
4	Data Movement Instructions (Instructions related with 8086 only)	1/4	
	• MOV revisited: Machine language,the op-code, MOD field, resister assignment,R/M memory addressing,special addr.mode		4
	• PUSH/POP, initializing stack		1
	• Miscellaneous data transfer instructions: XCHG, LAHF & SAHF		2
5	Arithmetic instructions		
	• Addition, subtraction and comparison		3
	• Multiplication and division		2
	• BCD and ASCII arithmetic		2
6	Logic instructions		
	• Basic logic Instructions		2
	• Shift and rotate		2
7	Program control Instructions		
	• The JUMP group		3
	• LOOP		1
	• CALL & RET		3

Core Reference:

1. The Intel Microprocessors: Architecture, programming and interfacing –
By Barry B. Brey
2. Microprocessors and Interfacing : Douglas Hall

Advance Programming in C

Objective: After working through this paper the students should be able to

- 1) Learn some advance features of C language.
- 2) Write programs using pointers, file handling.
- 3) Aware of graphics functions of C.

Sr. No	Topic	References	No. of Lectures
1.	Structure & Union <ul style="list-style-type: none"> • Structure: Introduction, Declaration and initializing structure, Accessing structure members, Nested structures, Arrays of structure, <i>typedef</i> statement. • Unions: Declaration, Difference between structure and union 	2/10, 1/10,	4
2.	Pointers: <ul style="list-style-type: none"> • Introduction, Memory organization. Declaration and initialization of pointers. The pointer operator * and &, De-referencing, Pointer expression and pointer arithmetic, Pointer to an array, Pointer to pointer, Constant pointers. 	2/11, 1/5	6
3.	Functions & Pointers: <ul style="list-style-type: none"> • Call by reference, Passing array and structure to function, functions returning pointers, character pointer, Two dimensional array of string, array of pointer to string, passing structure pointer to function, arrow (->) operator. 	2/9,11, 1/5	6
4.	Storage Class & Library Functions: <ul style="list-style-type: none"> • Storage classes, Scope, visibility and lifetime of variable, block and file scope, auto, extern, static and register storage classes. • String handling functions: strcpy(), strcmp(), strcat(), strlen(),strupr(), strlwr(), gets(), puts() • Data conversion functions from stdlib.h: atoi(), atol(), atof(), itoa(), ltoa(), random(), calloc(),malloc(),exit(), abs(), toupper(), tolower() 	2	6
5.	Preprocessor Directives: <ul style="list-style-type: none"> • File inclusion and conditional compiler directives, Macro substitution, #define, #if, #ifdef, #else, #elif, #endif, 	2/14, 1/7	5
6.	Miscellaneous Features: <ul style="list-style-type: none"> • Bitwise Operators: Introduction, Masking, Internal representation of data, Bit fields, Enumerated data types, Type casting. 	2/App-I, 1/15,	3

7. File Handling	2/12, 1/12,13	9
<ul style="list-style-type: none"> • File handling: Introduction, Opening & closing a file, Input/Output operations on files, text and binary files, getc(), putc() function. File copy program, fprintf() and fscanf(). fread() and fwrite() function. Writing and reading records from binary file, Appending, modifying and deleting a record from file, Random access functions fseek(), rewind(), flushall(), remove(), rename(). • Command line arguments: use of argc and argv. 		
8. Graphics in C:	4	5
<ul style="list-style-type: none"> • Introduction: initgraph() and detectgraph() function, Drawing object in C, Line, Circle, Rectangle, Ellipse, Changing foreground & background colors, Filling object by color, outtextx() function. 		

Core Reference:

- | | | |
|-----------------------|--------------------|---------------------|
| 1. Let us C Solutions | : Y.P. Kanetkar | [bpb publication] |
| 2. Programming in C | : E. Balagurusamy. | [Tata macgraw hill] |
| 3. Programming in C | : Goterfried | [Shaums Series] |
| 4. Graphics Under C | : Y. Kanetkar | |

Additional References:

- | | |
|--------------------------|-------------------|
| 1. Spirit of "C" | : Moolish Kooper. |
| 2. Test your Skills in C | : Y.Kanetkar |

Communication Skill- II

Objective: To introduce advance topics to self-assess various components of communication skills as well as to improve listening, reading, writing, and speaking and presentation skills through practice.

Numerical Computational Methods

Sr. No	Topic	Ref.	No. of Lect.
1	Error in Calculation <ul style="list-style-type: none"> • Significant Error , Absolute, Percentage, Relative Error • Chopping off and Rounding off Error. • Truncation Error, Propagation Error. 	1/1	2
2	Matrices and Determinants. <ul style="list-style-type: none"> • Definitions, Matrix Operations • Determinant of Square Matrix, Cofactor • Adjoint of Matrix, Inverse of Matrix, Rank of Matrix 	3/2	2
3	Numerical Solutions of Transcendental Equations <ul style="list-style-type: none"> • Concept of Iterative Methods, Search Method for Initial Guess. • Bisection Method • False Position Method • Newton-Raphson Method 	1/2	10
4	Elimination Methods for Solving Simultaneous Equations <ul style="list-style-type: none"> • Introduction and Matrix Notation of set of Equations • Gauss Elimination Method • Matrix Inverse Method 	1/3	7
5	Interpolation <ul style="list-style-type: none"> • Introduction and Polynomial Interpolation • Newton-Gregory Forward Difference Interpolation Formula • Newton-Gregory Backward Difference Interpolation Formula • Central Difference Formula • Newton's divided Difference Interpolation • Lagrange's Interpolation • Spline Interpolation • Cubic Spline Interpolation • Applications of Interpolation 	1/6	16
6	Least Square Curve Fitting <ul style="list-style-type: none"> • Best Fit and Criteria for Best Fit and Least Square Fit. • Linear Regression. • Polynomial Regression. 	1/7	8

Core Reference Books:

1. "Numerical Computational Methods" - Dr. P.B.Patil, Narosa Publication Hous.

Advance Reference Books:

1. Numerical methods -S.C.Chapra, R.P.Canale-McGraw Hill
2. Numerical methods-E.Balguruswamy

Data Structure & Operating System

Assignments: Write the Program using C (if applicable) :

Data Structure:

1. Write a program using DIV(J,K) which reads a positive integer N>10 and determines whether or not N is a prime number.
2. Write a program which counts the number of particular character/word in the String.
3. Write a program which reads words WORD1 and WORD2 and then replaces each occurrence of word1 in text by word2
4. Write the programs for traversing of n item using the array.
5. Write the programs for insertion and deletion of n item using the array.
6. Implement Linear and binary search algorithm using C.
7. Implement Bubble sort using C.
8. Write the programs for traversing of n item from the linked list.
9. Write the programs for push and pop operation using the stacks.
10. Write the programs for insertion and deletion of n item from the queues.

Operating System:

- 1. Study of Unix/Linux Command.**
2. Write a program to implement the FCFS Scheduling Algorithms.
3. Write a program to implement the SJF Scheduling Algorithms.
4. Write a program to implement the Priority Scheduling Algorithms.
5. Write a program to implement the Round Robin Scheduling Algorithms.

8086 Microprocessor

Any ten experiments from the list given below:

1. Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8086.
2. Addition and subtraction of two 16-bit numbers. (Using 2's complement method, also programs which access numbers from specified memory locations)
3. Multiplication of two 8-bit numbers using the method of successive addition and Shift & add.
4. Division of two 8-bit numbers using the method of successive subtraction and shift & subtract.
5. Block transfer and block exchange of data bytes.
6. Finding the smallest and largest element in a block of data.
7. Arranging the elements of a block of data in ascending and descending order.
8. Generating delays of different time intervals using delay subroutines and measurement of delay period on CRO using SOD pin of 8086.
9. Program for Summation of First n Number.
10. Program for Factorial of n.
11. Program for Addition of Array elements.
12. Program for Reversing the Array elements.

Advance Programming in C

1. Swapping of numbers by using call by reference
2. Program to pass array to function.
3. Program for passing structure pointer to function.
4. String manipulation function e.g. string copy, concatenation, compare, string length, reverse
5. Program for reading/writing text file.
6. Program for reading/writing binary file
7. File copy program.
8. Program to modify a record from binary file
9. Program to delete a record from binary file
10. Program on conditional compiling
11. Program on macro substitution.
12. Program for data conversion
13. Program to draw simple pictures (human face, clock, hut, etc.) using graphics functions.
14. Program using command line arguments.
15. Program to demonstrate the storage class.
16. Program to sort names.

Implementation of Numerical Computational Methods Using C.

1. Program in C for representation of, Inverse of Matrix
2. Program in C for representation of, Bisection Method
3. Program in C for representation of, False Position Method
4. Program in C for representation of, Newton-Raphson Method
5. Program in C for representation of, Gauss Elimination Method
6. Program in C for representation of, Matrix Inverse Method
7. Program in C for representation of, Newton-Gregory Forward Difference Interpolation Formula
8. Program in C for representation of, Newton-Gregory Backward Difference Interpolation Formula
9. Program in C for representation of, Central Difference Formula
10. Program in C for representation of, Newton's divided Difference Interpolation
11. Program in C for representation of, Lagrange's Interpolation
12. Program in C for representation of, Spline Interpolation

Dr. Babasaheb Ambedkar Marathwada University.

Appendix 'A'

A Candidate shall be admitted to the I year of the B.C.A.(Science) degree course only if he/she satisfies the following condition:

1. He/ She must have passed the higher secondary (multipurpose) examination conducted by H.S.C. board Government of Maharashtra with science / technical subjects Or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

He/She must have passed examination prescribed at the end of second year of the junior college conducted by the H.S.C. board, Government of Maharashtra with English, Second language, Physics, Chemistry, Mathematics and or Biology or one of the technical subjects prescribed at the said examination as the optional or elective subjects or an examination recognized as equivalent thereto.

OR

Candidate having offered prescribed vocational course (MCVC) with Computer techniques/I.T./Electronics.

OR

Three years Diploma Course in engineering conducted by the board of technical Education, Maharashtra State.

2. He/ She must have passed with minimum **50%** of marks (**45%** reserved category) at qualifying examination.

A candidate who has passed the B.C.A.(Science) examination of this university may be allowed to present himself subsequently at the degree examination in a subject or subjects other than those he has taken earlier provided that he puts in three years of attendance as a regular candidate for First, Second and Third year in the subject or subjects concerned excluding compulsory English, Second Language and remaining optional subject(s).

A candidate shall not be allowed to appear for such examination if he has passed the higher examination.

The Degree of Bachelor of Computer Application (Science) shall be conferred on candidate who has pursued a regular course of study consisting of six semesters in the relevant subject as prescribed and has appeared at the end examination and passed under the credit based system in all the examination prescribed for the Degree course in the faculty.

- The pattern of the examination and the scope is indicated in the syllabus.
- The Number of students in a theory class shall not exceed 60.
- Maximum number of students in a batch for practicals in first four semesters shall consist of 20 students and for fifth & sixth semester the batch shall consist of 15 students.
- A candidate will not be allowed to admit in Third Semester, if he/she failed to gain the complete (27) credits of the First Semester and a candidate will not be allowed to get admission in Fifth Semester, if he/she failed to gain the complete credits of the Second and Third Semester.
- For Each course the concerned teacher will have to conduct two Class tests after completion of 15 and 30 lectures respectively. The mark list of the same is to be submitted to the university authority within 7 working days after the completion of class tests.
- Final Examination will be conducted by the University based on the complete syllabus.
- Final Practical Examination will be conducted by the university and examiners will submit the grade of students for practical examination to the university.
- There will be 40% weightage for two class test and 60% for the final theory examination. The concerned teachers have to take class test in their teaching schedule. There shall not be separate timetable for the class test.
- The schedule for the first class test will tentatively be after 30 working days (not later than 31 August/10 February), second class test after 60 working days (not later than 15 October/15 March) and Final examination after 75 working days in respective semesters.
- The final grade will be given to the candidate by the university. If Marks of the final Theory examination in any course is less than 40%, the Candidate will be given **F grade**, in that course irrespective of marks obtained in the class tests.

Grade:

The grade will be given as follows:

The candidate with more than or equal to 75% marks will get A+ grade.

The candidate with 60% & above and less than 75% marks will get A grade.
The candidate with 55% & above and less than 60% marks will get B+ grade.
The candidate with 50% & above and less than 55% marks will get B grade.
The candidate with 45% & above and less than 50% marks will get C+ grade.
The candidate with 40% & above and less than 45% marks will get C grade.
The candidate with less than 40% marks will get F grade.

Any students with F grade will be considered to be failed in the course. He/She has to repeat the course as per the guidelines given by the college. During repetition of the course the candidate has to re-appear for the class tests and final examination. The course incharge of the course will conduct the class test.

Points Calculation:

Grade	Points
A+	10
A	9
B+	8
B	7
C+	6
C	5
F	0

Grade Point Average (GPA):

The student will have GPA between 4 to 10 computed as follows:

$$\text{GPA} = \frac{\text{Sum (Course credit * number of points obtained)}}{\text{Sum (Course Credit)}}$$

The final grade will be assigned to students on the basis of final GPA, as follows:

Final Grade as per the final GPA:

Equivalent Percentage	GPA	Final Grade
More than or Equal to 75%	$\text{GPA} \geq 9$	A+
60% and less than 75%	$8 \geq \text{GPA} < 9$	A
55% and less than 60%	$7 \geq \text{GPA} < 8$	B+
50% and less than 55%	$6 \geq \text{GPA} < 7$	B
45% and less than 50%	$5 \geq \text{GPA} < 6$	C+
40% and less than 45%	$4 \geq \text{GPA} < 5$	C
Below	$< 4 \text{ GPA}$	F

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Curriculum Structure and Scheme of Evaluation: B.C.A.(Sci.)

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/ week	P hrs/ week	Total hrs/ week	Total Credits	Class Tests	Univ. Th. Exam.	Uni. Pract. Exam.	Uni.Exam Duration (in hrs.)	Total Marks
Semester I											
1	301T	Computer Fundamentals	3	-	3	3	20+20	60	-	3	100
2	302T	Digital Electronics	3	-	3	3	20+20	60	-	3	100
3	303AT	8085:Microprocessor	3	-	3	3	20+20	60	-	3	100
4	304AT	Programming in C	3	-	3	3	20+20	60	-	3	100
5	305ATP	Communication Skill – I	2	1	3	3	20+20	60	-	3	100
6	306AT	Mathematical Foundation	3	-	3	3	20+20	60	-	3	100
7	301P	Office Suite	-	6	6	3	-	-	50	4	50
8	202P	Digital Electronics	-	4	4	2	-	-	50	4	50
9	203AP	8085:Microprocessor	-	4	4	2	-	-	50	4	50
10	204AP	Programming in C	-	4	4	2	-	-	50	4	50
Total of Semester – I			17	19	36	27	240	360	200	-	800
Semester II											
1	307T	Data Structure	3		3	3	20+20	60	-	3	100
2	308AT	Operating System I	3		3	3	20+20	60	-	3	100
3	303BT	8086:Microprocessor	3		3	3	20+20	60	-	3	100
4	304BT	Adv. Programming in C	3		3	3	20+20	60	-	3	100
5	305BTP	Communication Skill - II	2	1	3	3	20+20	60	-	3	100
6	306BT	Numerical Computation Methods	3	-	3	3	20+20	60	-	3	100
7	307P	Data Structure & O.S.	-	6	6	3	-	-	50	4	50
8	203BP	8086:Microprocessor	-	4	4	2	-	-	50	4	50
9	204BP	Adv. Programming in C	-	4	4	2	-	-	50	4	50
10	206BP	Numerical Methods	-	4	4	2	-	-	50	4	50
Total of Semester – II			17	19	36	27	240	360	200	-	800

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Curriculum Structure and Scheme of Evaluation: B.C.A.(Sci.)

Sr. No.	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/ week	P hrs/ week	Total hrs/ week	Total Credit	Class Test	University Exam.	Uni. Pract. Exam.	Uni.Exam Duration (in hrs.)	Total Marks
Semester III											
1	309AT	Analysis of Algorithm	3	-	3	3	20+20	60	-	3	100
2	308BT	Operating System II	3	-	3	3	20+20	60	-	3	100
3	312AT	DBMS – I	3	-	3	3	20+20	60	-	3	100
4	304CT	OOPs using C++	3	-	3	3	20+20	60	-	3	100
5	306CT	Statistical Method	3	-	3	3	20+20	60	-	3	100
6	305CT	Tech.writing	3	-	3	3	20+20	60	-	3	100
7	209AP	Pr. Based on 309AT	-	4	4	2	-	-	50	4	50
8	208BP	Pr. Based on 308BT	-	4	4	2	-	-	50	4	50
9	212AP	Pr. Based on 312AT	-	4	4	2	-	-	50	4	50
10	204CP	Pr. Based on 304CT	-	4	4	2			50	4	50
11	106CP	Pr. Based on 306CT	-	2	2	1			50	2	50
Total of Semester – III			18	18	36	27	240	360	250	-	850
Semester IV											
1	326AT	Soft. Proj. Mgmt-I	3		3	3	20+20	60	-	3	100
2	327T	Adv. DBMS using SQL	3		3	3	20+20	60	-	3	100
3	314AT	DCN – I	3		3	3	20+20	60	-	3	100
4	310AT	OOPs using Java–I	3		3	3	20+20	60	-	3	100
5*	335T	Financial Accounting	3		3	3	20+20	60	-	3	100
6*	316AT	Web Fund-I	3		3	3	20+20	60	-	3	100
7*	336T	Principal of Mgmt	3		3	3	20+20	60	-	3	100
8*	317T	Linux	3		3	3	20+20	60	-	3	100
9	126AP	Pr. Based on 326AT	-	2	2	1			50	2	50
10	227P	Pr. Based on 327T	-	4	4	2			50	4	50
11	210AP	Pr. Based on 310AT	-	4	4	2			50	4	50
12	235P/216 AP/ 236P/ 217P	Pr. Based on 335T/316AT / 336T/317T	-	4	4	2			50	4	50
13	235P/216 AP/ 236P/ 217P	Pr. Based on 335T/316AT / 336T/317T	-	4	4	2			50	4	50
Total of Semester – IV			18	18	36	27	240	360	250	-	850

* Indicate optional paper (any two from Sr.No. 5/6/7/8)

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: B.C.A.(Sci.)

Sr. No	Course Code	Name of the Subject	Scheme of Teaching				Scheme of Evaluation(Marks)				
			T hrs/ week	P hrs/ week	Total hrs/ week	Total Credit	Class Test	University Exam.	Uni. Pract. Exam.	Uni.Exam Duration (in hrs.)	Total Marks
Semester V											
1	326BT	Soft.proj.mgmt-II	3	-	3	3	20+20	60	-	3	100
2	314BT	DCN-II	3	-	3	3	20+20	60	-	3	100
3	337T	MIS	3	-	3	3	20+20	60	-	3	100
4	315AT	Computer Graphics	3	-	3	3	20+20	60	-	3	100
5*	330T	E-Business	3	-	3	3	20+20	60	-	3	100
6*	304ET	GUI Prog	3	-	3	3	20+20	60	-	3	100
7*	333T	Internet Prog Using Php	3	-	3	3	20+20	60	-	3	100
8*	338T	DBA	3	-	3	3	20+20	60	-	3	100
9	226BP	Pr. Based on 326BT	-	4	4	2	-	-	50	4	50
10	114BP	Pr. Based on 314BT	-	2	2	1	-	-	50	2	50
11	215AP	Pr. Based on 315AT	-	4	4	2	-	-	50	4	50
12	230P/204E P / 233P/ 238T	Pr. Based on 330T / 304ET /333T / 338T	-	4	4	2	-	-	50	4	50
13	230P/204E P/233P/ 238T	Pr. Based on 330T / 304ET /333T / 338T	-	4	4	2	-	-	50	4	50
Total of Semester – V			18	18	36	27	240	360	250	-	850
Semester VI											
1	313CT	Soft.Test.andQA	3		3	3	20+20	60	-	3	100
2	332T	Cust Rela Mgmt	3		3	3	20+20	60	-	3	100
3	323T	Ethics and Cyber law	3		3	3	20+20	60	-	3	100
4	331AT	Mutlimedia tech.	3		3	3	20+20	60	-	3	100
5*	321BT	KDD	3		3	3	20+20	60	-	3	100
6*	339T	PHP	3		3	3	20+20	60	-	3	100
7*	334T	ERP	3		3	3	20+20	60	-	3	100
8*	314CT	Mobile Computing	3		3	3	20+20	60	-	3	100
9	740P	PROJECT WORK	-	14	14	7** (1+2+4)			200	6	200
10	241P	SEMINAR	-	4	4	2*** (1+1)			50	3	50
Total of Semester – VI			18	18	36	27	240	360	250	-	850

* Indicate optional paper (any two from 5/6/7/8)

** Indicates credit for review 1, review 2 and Actual Project Work.

*** Indicates credit for review 1 and Actual Seminar presentation.