SUBJECT : Comp. Sci.(opt.) **Semester : I** **Hours/week : 3**
Code : CS101 **Credit : 3**

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**
	• Introduction.	1/1	
	• Characteristics & features of Computers.		
	• Components of Computers.		
	• Organization of Computer.		
2.	**Data Representation**		**12**
	• Introduction to Number System	1/3	4
	o Decimal Number System		
	o Binary Number System		
	o Hexadecimal Number System		
	• Conversion within Numbers Systems	1/3	4
	• Arithmetic Operation on Binary and Hexadecimal Numbers		
	• Normalized Floating point Number	2/2	4
	• Representation of Character in Computers		
	• Representation of Integer Numbers		
	• Representation of Fraction Numbers		
	• Hexadecimal Representation of Number		
3.	**Algorithm and Flowcharts**		**6**
	• Algorithm	2/1	3
	o Definition		
	o Characteristics		
	o Advantages and disadvantages		
	o Examples		
	• Flowchart	3/3	3
	o Definition		
	o Define symbols of flowchart	3/ 4	
	o Advantages and disadvantages		
	o Examples		
4.	**Computer Generation & Classification**		**3**
	• Generation of Computers : First to Fifth	2/12	
	• Classification of Computers		
	• Distributed & Parallel computers		
5.	**Computer Languages**		**3**
	• Types of Programming Languages	2/9	
	o Machine Languages		
	o Assembly Languages		
	o High Level Languages		
	• Assembler, Linker, Loader, Interpreter & Compiler.	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 paralle-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

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.

SUBJECT : Comp. Sci.(opt.) Semester : I Hours/week : 3
Code : CS104 Credit : 1.5

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

SUBJECT : Comp. Sci.(opt.) **Semester : II** **Hours/week : 3**
Code : CS201 **Credit : 3**

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**
	• **Software:** Definition, classification and components of software, operating system as the main component of system software;		2
II	**Operating System Fundamental**	2/1	**7**
	• **Operating Systems**: OS as a resource manager, Structure of OS, Evolution of OS, OS functions, Characteristics of modern OS.		2
	• **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		3
	• **OS Structures:** Components of OS: Process management, Memory management, Storage management, File management, I/O management.		2
III	**Process Management**	1/2	**18**
	• **Concept of Process**: Process State, Operation on Processes, thread.		3
	• **CPU Scheduling** : Types of Schedulers, Criteria for scheduling, Scheduling Algorithms.		5
	• **Process Synchronization:** Need for synchronization, Critical Section, Hardware Synchronization, Semaphores, Monitors, Problem of synchronization.		5
	• **Deadlocks:** Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock		5
IV	**Storage Management**	1/3	**12**
	• **Memory Management**: Address Binding, Logical Vs. Physical Address space, Memory Allocation, Paging, Segmentation, Segmentation and paging of Intel Pentium.		4
	• **Virtual Memory:** Demand Paging, Page replacement Algorithms (FIFO, Optimal, LRU), Virtual Memory in windowsXp.		4
	• **File System Interface**: Files, File Access, Directory Structure, Protection		2
	• Implementation of File System: Allocation Methods, Free space Management		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.

SUBJECT : Comp. Sci.(opt.) **Semester : II** **Hours/week : 3**
Code : CS202 **Credit : 3**

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** • 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** • 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 & Associatively of Operators	2/2,3, 1/1	6
3.	**Data Types** • Data Types: *int, char, float, double*. Declaration & Initialization. • Type modifiers: long, short, signed and unsigned	2/2, 1/1, 1/6	3
4.	**C Program & I/O statements** • Structure of C Program, Compilation & Execution of C program I/O: Introduction, Formatted Input/Output function: *scanf & printf*, Escape sequence characters. • Library functions: General used & Mathematical.	2/4, 2/3, 1/1	3
5.	**Control and Iterative Statements :** • Simple if, nested if, if-else, else if ladder • Switch-case statement • The conditional expression (? : operator) • *while* and *do-while* loop, and *for* loop • *break* & *continue* statement, *goto* statement	2/5, /6, 1/3, 1/4	12
6.	**Arrays:** • 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 • Introduction, types of functions. Defining functions, Arguments, Function prototype, actual parameters and formal parameters, Calling function, Returning function results, Call by value, Recursion.		2/9, 1/5, 3	6

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.

Operating System

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

Operating System:

1. **Study of DOS Commands.**
2. **Study of Unix/Linux Commands.**
3. Write a program to implement the FCFS Scheduling Algorithm.
4. Write a program to implement the SJF Scheduling Algorithm.
5. Write a program to implement the Priority Scheduling Algorithm.
6. Write a program to implement the Round Robin Scheduling Algorithm.

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

Dr. Babasaheb Ambedkar Marathwada University.

Appendix 'A'

A Candidate shall be admitted to the I year of the B.Sc.(Computer 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.Sc.(Computer 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 Science (Computer 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:

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

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%	GPA >=9	A^+
60% and less than 75%	8 ≥ GPA < 9	A
55% and less than 60%	7 ≥ GPA < 8	B+
50% and less than 55%	6 ≥ GPA < 7	B
45% and less than 50%	5 ≥ GPA < 6	C+
40% and less than 45%	4 ≥ GPA < 5	C
Below	< 4 GPA	F

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Curriculum Structure and Scheme of Evaluation: Computer Science (Optional)

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	University Theory Exam.	University Practical Exam.	Duration	Total Marks
Semester I										
1	CS101	Computer Fundamentals	3	-	3	3	50	-	3	50
2	CS102	Digital Electronics	3	-	3	3	50	-	3	50
3	CS103	Office Suite	-	3	3	1.5	-	50	3	50
4	CS104	Digital Electronics	-	3	3	1.5	-	50	3	50
Total of Semester – I			6	6	12	9	100	100		200
Semester II										
5	CS201	Operating System I	3		3	3	50	-	3	50
6	CS202	Programming in C	3		3	3	50	-	3	50
7	CS203	Operating System	-	3	3	1.5	-	50	3	50
8	CS204	Programming in C	-	3	3	1.5	-	50	3	50
Total of Semester – II			6	6	12	9	100	100		200