INSTITUTE OF SCIENCE, NAGPUR

(An Autonomous Institute of Government of Maharashtra)

Department of Computer Science

CREDIT STRUCTURE, EVALUATION SCHEME, AND SYLLABUS
OF
FOUR-YEAR BACHELOR OF SCIENCE (HONORS/RESEARCH) DEGREE WITH A SEMESTER PATTERN IN STATISTICS (FACULTY OF SCIENCE & TECHNOLOGY)
BASED ON

DIRECTION 1 OF 2024 ISSUED BY THE INSTITUTE OF SCIENCE,

NAGPUR AS PER NEP 2020

(TO BE IMPLEMENTED FROM ACADEMIC YEAR 2024-2025)

COMPUTER SCIENCE - MAJOR

Programme Outcomes

The objectives of the Program

1. The primary objective of this program is to provide a foundation of computing principles for effectively using information systems and enterprise softwares.
2. It helps students analyze the requirements for system programming and exposes students for information systems
3. This programme provides students with options to specialize in various software system.
4. To produce outstanding Computer Scientists who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications

Programme Specific Outcomes:

Upon completion of the program, students would be able to

1. Discipline knowledge: Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. Problem Solving: Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. Design and Development of Solutions: Ability to design and development of algorithmic solutions to real world problems.
4. Programming a computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day scientific applications.
5. Application Systems Knowledge: Possessing a minimum knowledge to practice existing computer application software.
6. Communication: Must have a reasonably good communication knowledge both in oral and writing.
7. Ethics on Profession, Environment and Society: Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computerbased solutions for problems.
8. Lifelong Learning: Should become an independent learner. So, learn to learn ability.
9. Motivation to take up Higher Studies: Inspiration to continue educations towards advanced studies on Computer Science.

The structure of the course for four years, the pattern of examination, and the question papers are as specified below:

Structure of Four Year-degree Program

Statistics as Major (Core) Subject and any other subject as Minor Table 1: B.Sc. Semester I

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	DSC	B-CS111T	Paper 1:- **Fundamentals of Information Technology**	4.5	2
		B-CS112P	DSC Lab		1
2	GE	B-CS113T	Refer to GE Basket		2
		B-CS114T	Refer to GE Basket		2
3	VSEC	B-CS115P	Refer VSC Basket		2
4	IKS	B-CS116T	Indian Knowledge System		2
Total					22

Table 2: B.Sc. Semester II

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	DSC	B-ST121T	Paper 1:- Programming in 'C	4.5	2
		B-ST122P	DSC Lab		1
2	GE	B-ST123T	Refer to GE Basket		2
		B-ST124T	Refer to GE Basket		2
3	VSEC	B-ST125P	Refer VSC Basket		2
4	IKS	B-ST126T	Indian Knowledge System		2
Total					22

List of Vocational Skill Courses (VSC) available with Computer Science as Major or Minor (Offered by the Department of Computer Science):

S.No.	Year	Semester	Course Code	Name of the paper	Credits	Practical Hrs
1	I	I	B-CS115P	Office Automation	2	4
2	I	II	B-CS125P	Computer Animation	2	4

List of Generic / Open Electives (OE) available with any Major subject other than faculty Science and Technology (Offered by the Department of Computer Science):

S.No.	Year	Semester	Course Code	Name of the paper	Credits	Practical Hrs
1	I	I	B-CS113T	Office Automation	2	2
2	I	I	B-CS114T	Fundamentals of Information Technology	2	2
3	I	II	B-CS123T	PROGRAMMING IN 'C'	2	2
4	I	II	B-CS124T	WEB TECHNOLOGIES	2	2

Credit Specifications:

a. Theory/Tutorial Courses: One hour/credit/week (a minimum of 15 hours of teaching per credit is required in a semester.

b. Laboratory/Performance-Based Courses: A minimum of 30 hours in laboratory or Performance-based activities is required in a semester. Performance-based activities include Workshop-based activities, internships, Apprenticeships, Field-based learning, community engagement learning, etc.

c. Each semester will consist of at least 15 weeks of Academic Work equivalent to 90 actual teaching days.

Assessment

The assessment Plan will consist of Continuous Internal Evaluation (CIE) and End Semester Evaluation (ESE) for each course/subject taken together.

(A) Continuous Internal Evaluation (CIE) will be based

(a) Attendance of the student during a particular semester

(b) An assignment (min. two) based on curriculum to be assessed by the teacher concerned

(c) Subject-wise class test (min. two) or activities conducted by the teacher concerned with proper rubrics.

(d) Expected classroom activities shall consist of Group Discussions, Seminars, PowerPoint Presentations, Elocution, Debate, Role Play, Case Studies, Educational Games, etc. The teacher is expected to undertake a minimum of four of the aforesaid activities.

(e) The CIE marks will be communicated to the examination cell at the end of each semester, but before the semester end examinations / as instructed by the Examination Cell. These marks will be considered for the declaration of the results.

(f) The record of internal marks, evaluation & results should be maintained for a minimum period of three years by the respective department for verification by the competent authority.

End Semester Evaluation (ESE)

(a) Pattern of Theory Question Paper of 80 marks

1. There will be four units in each paper.
2. Maximum marks for each theory paper will be 80.
3. The question paper will consist of five questions, each of 16.
4. Four questions will be on four units with internal choice (One question on each unit).
5. Fifth question will be compulsory with questions from each of the four units having equal weightage and there will be no internal choice.

(b) Pattern of Theory Question Paper of 60 marks

1. There will be four units in each paper.
2. Maximum marks for each theory paper will be 60.
3. The question paper will consist of five questions, each of 12 marks.
4. Four questions will be on four units with internal choice (One question on each unit).
5. Fifth question will be compulsory with questions from each of the four units having equal weightage and there will be no internal choice.

(b) Pattern of Theory Question Paper of 40 marks

1. There will be four units in each paper.
2. Maximum marks for each theory paper will be 40.
3. The question paper will consist of five questions, each of 08 marks.
4. Four questions will be on four units with internal choice (One question on each unit).
5. Fifth question will be compulsory with questions from each of the four units having equal weightage and there will be no internal choice.

Standard of Passing

The scope of the course, percentage of passing in Theory and Project, and Internal Assessment will be governed as per the following rules:

(i) To pass the Bachelor of Science (B.Sc.) 1st, 2nd, 3rd, 4th, 5th, 6th, 7th, and 8th Semester Examinations, an examinee shall obtain not less than 40 % (Grade 4) marks in each theory course/paper, taking CIE & SEE together. Whereas, for practical/performance-based examinations an examinee shall obtain not less than 50 % marks in each practical, taking CIE & SEE together.

(ii) An examinee who is unsuccessful at the examination shall be eligible for admission to the subsequent examinations on payment of a fee prescribed for the examination together with the conditions of the ordinance in force from time to time.

Abbreviations Used

Continuous Internal Evaluation: (CIE) End Semester Evaluation: (ESE) Generic/Open Electives: OE, Vocational Skills & Skill Enhancement Courses: VSEC, Vocational Skill Courses: VSC, Skill Enhancement Courses: SEC, Ability Enhancement Courses: AEC, Indian Knowledge Systems: IKS, Value Education Courses: VEC, On Job Training (Internship/Apprenticeship): OJT, Field Project: FP, Community Engagement & Service: CEP, Co-curricular Courses: CC, Research Methodology: RM, Research Project: RP

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SYLLABUS

SEMESTER I

DSC I FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-CS111T	**Title:: Fundamentals of Information Technology**	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To understand the basic digital components of computer.
2. To understand the working of peripheral devices.
3. To understand the number systems and logical gates.
4. To understand the network topologies.

OUTCOMES

After completing this course satisfactorily, a student will be able to:

1. Confidently operate computers to carry out computational tasks
2. Understand working of Hardware and Software and the importance of operating systems
3. Understand number systems, peripheral devices, networking, multimedia and internet concepts

Unit No.	Content	No. of Hours
Unit - I	(A) Basic Components of Digital Computers: Block Diagram. CPU: Functions of Each Unit: Primary Memory, ALU and CU: Fetch and Execution cycle, Execution of Instructions in Single Address CPU. Memory: RAM, ROM, PROM, EPROM, EEPROM and Cache. (B) CISC and RISC Technology Bus: Data, Control and Address Bus, Bus Organization. Language Evolution: Generation of Languages: Machine, Assembly, High Level Languages. Characteristics of Good Language (C) Translators: Compiler, Interpreter and Assembler. Source and Object Program.	**(7.5Hrs)**
Unit – II	(A) Storage Devices: Hard Disk and Optical Disk. Pen Drive, SD Card, Cloud as storage. (B) Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner. (C) Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet. (D) Plotters: Drum, Flat-Bed and Inkjet.	**(7.5Hrs)**
Unit – III	(A) Number Systems: Binary, Octal, Decimal, Hexa-Decimal, Their Conversions, Binary Arithmetic. ASCII, BCD, EBCDIC. (B) Logic Gates: Truth table, properties and symbolic representation of NOT, AND, OR, NOR, NAND, EXOR, EXNOR gates. NOR and NAND gates as a universal gates. (C) Binary Arithmetic: Binary addition, binary subtraction using 1's and 2's compliment.	**(7.5Hrs)**

Unit - IV	**(A)** Network: Network terminology, Topologies: Linear, Circular, Tree and Mesh. Types of Networks: LAN, WAN, MAN. **(B)** Networking Devices: Repeaters, Bridges, Routers and Gateway. Modem for Communication between pc's, wi-fi network, Introduction of Bluetooth and Infrared devices. (C) Network Architecture: Peer-to-Peer, Client/Server Internet Protocols: TCP/IP, FTP, HTTP, HTTPS, Internet Addressing: IP Address, Domain Name, URL.	**(7.5Hrs)**
REFERENCES:		
1	Information Technology Concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi].	
2	Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai &Vikas Publishing House Pvt. Ltd, New Delhi].	
3	Fundamental of Micropocessor by B Ram	

DSC LAB FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-CS112P	**PRACTICALS Based ON DSC I using tools**	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

Practical No.	Content
1	Construct a flowchart and Write an algorithm to Compute Fibonacci series
2	Construct a flowchart and Write an algorithm to find if a given number is prime or not.
3	Construct a flowchart and Write an algorithm to accept a number and display it in words
4	Construct a flowchart and Write an algorithm to find the sum of digits of any entered no.
5	Construct a flowchart and Write an algorithm to reverse the digit.
6	Construct a flowchart and Write an algorithm to find the frequency of occurrence of a given number from an array of N elements.
7	Construct a flowchart and Write an algorithm to reverse the array.
8	Construct a flowchart and Write an algorithm to Insert an element in One dimensional Array at a given position.
9	Construct a flowchart and Write an algorithm to Delete an element from One dimensional Array.
10	Construct a flowchart and Write an algorithm to Arrange string data (name of students) in alphabetical order using bubble sort.
11	Construct a flowchart and Write an algorithm to find Factorial of a number using recursive function.
12	Design logic gates

VSC AVAILABLE WITH COMPUTER SCIENCE MAJOR / MINOR		
Paper Code: B-CS115P	Office Automation	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

OBJECTIVES

1. To understand functionality of Operating Systems and its applications.
2. To understand the working with the user interface.
3. To understand Word Processing, their usage, details of word processing screen, Opening, saving and printing a document
4. To understand Worksheet creation, inserting and editing data in cells.

OUTCOMES

After completing this course satisfactorily, a student will be able to:

1. understand functionality of Operating Systems and its applications.
2. Working with the user interface.
3. prepare documents, letters and do necessary formatting of the document.
4. Worksheet creation, inserting and editing data in cells.
5. Opening/saving a presentation and printing of slides and handouts.

Unit No.	Content	
Unit - I	Introduction to windows Operating System Advantages of windows operating system, using different windows applications simultaneously, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, my computer, my documents, recycle bin, finding folders and files, changing system settings, system tools, use of run command, setting peripherals, drivers, editing graphics in windows.	**(15Hrs)**
Unit – II	Introduction, basics, starting Word, creating document, parts of Word window, mouse and keyboard operations, designing a document; Formatting- selection, cut, copy, paste; Toolbars, operating on text; Printing, saving, opening, closing of document; Creating a template; Tables, borders, pictures, text box operations; Mail Merge.	**(15Hrs)**
Unit – III	Introduction to MS EXCEL, navigating, Excel toolbars and operations, Formatting; copying data between worksheets; entering formula, chart creation; data forms, data sort; Functions in ExcelROUND( ), SQRT ( ), MAX( ), MIN( ), AVERAGE( ), COUNT( ), SUMIF( ), SUMIF( ), ABS( ), ROMAN( ), UPPER( ), LOWER( ), CELL( ), TODAY( ), NOW( ).	**(15Hrs)**
Unit – IV	Introduction to MS POWER POINT Working with Power Point Window, Standard Tool Bar, Formatting tool bar, Drawing tool Bar, Moving the Frame, Inserting Clip Art, Picture, Slide, Text Styling, Send to back, Entering data to graph, Organization Chart, Table,Design template, Master Slide, Animation Setting, Saving and Presentation , auto Content Wizard.	**(15Hrs)**

REFERENCES:

1	MS Office XP for Everyone By Sanjay Saxena (Vikas Publi, Noida)
2	MS-Office 2000(for Windows) By Steve Sagman
3	A First Course in Computers – Sanjay Saxena

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS113T	Office Automation	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To understand functionality of Operating Systems and its applications.
2. To understand the working with the user interface.
3. To understand Word Processing, their usage, details of word processing screen, Opening, saving and printing a document
4. To understand Worksheet creation, inserting and editing data in cells.

OUTCOMES

After completing this course satisfactorily, a student will be able to:

1. understand functionality of Operating Systems and its applications.
2. Working with the user interface.
3. prepare documents, letters and do necessary formatting of the document.
4. Worksheet creation, inserting and editing data in cells.
5. Opening/saving a presentation and printing of slides and handouts.

Unit No.	Content	
Unit - I	Introduction to windows Operating System Advantages of windows operating system, using different windows applications simultaneously, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, my computer, my documents, recycle bin, finding folders and files, changing system settings, system tools, use of run command, setting peripherals, drivers, editing graphics in windows.	**(7.5Hrs)**
Unit – II	Introduction, basics, starting Word, creating document, parts of Word window, mouse and keyboard operations, designing a document; Formatting- selection, cut, copy, paste; Toolbars, operating on text; Printing, saving, opening, closing of document; Creating a template; Tables, borders, pictures, text box operations; Mail Merge.	**(7.5Hrs)**
Unit – III	Introduction to MS EXCEL, navigating, Excel toolbars and operations, Formatting; copying data between worksheets; entering formula, chart creation; data forms, data sort; Functions in ExcelROUND( ), SQRT ( ), MAX( ), MIN( ), AVERAGE( ), COUNT( ), SUMIF( ), SUMIF( ), ABS( ), ROMAN( ), UPPER( ), LOWER( ), CELL( ), TODAY( ), NOW( ).	**(7.5Hrs)**
Unit – IV	Introduction to MS POWER POINT Working with Power Point Window, Standard Tool Bar, Formatting tool bar, Drawing tool Bar, Moving the Frame, Inserting Clip Art, Picture, Slide, Text Styling, Send to back, Entering data to graph, Organization Chart, Table,Design template, Master Slide, Animation Setting, Saving and Presentation , auto Content Wizard.	**(7.5Hrs)**

REFERENCES:

1	MS Office XP for Everyone By Sanjay Saxena (Vikas Publi, Noida)
2	MS-Office 2000(for Windows) By Steve Sagman
3	A First Course in Computers – Sanjay Saxena

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS114T	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To understand the basic digital components of computer.
2. To understand the working of peripheral devices.
3. To understand the number systems and logical gates.
4. To understand the network topologies.

OUTCOMES

After completing this course satisfactorily, a student will be able to:

1. Confidently operate computers to carry out computational tasks
2. Understand working of Hardware and Software and the importance of operating systems
3. Understand number systems, peripheral devices, networking, multimedia and internet concepts

Unit No.	Content	
Unit - I	(A) Basic Components of Digital Computers: Block Diagram. CPU: Functions of Each Unit: Primary Memory, ALU and CU: Fetch and Execution cycle, Execution of Instructions in Single Address CPU. Memory: RAM, ROM, PROM, EPROM, EEPROM and Cache. (B) CISC and RISC Technology Bus: Data, Control and Address Bus, Bus Organization. Language Evolution: Generation of Languages: Machine, Assembly, High Level Languages. Characteristics of Good Language (C) Translators: Compiler, Interpreter and Assembler. Source and Object Program.	**(7.5Hrs)**
Unit – II	(A) Storage Devices: Hard Disk and Optical Disk. Pen Drive, SD Card, Cloud as storage. (B) Input Devices: Keyboard, Mouse, Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner. (C) Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet. (D) Plotters: Drum, Flat-Bed and Inkjet.	**(7.5Hrs)**
Unit – III	(A) Number Systems: Binary, Octal, Decimal, Hexa-Decimal, Their Conversions, Binary Arithmetic. ASCII, BCD, EBCDIC. (B) Logic Gates: Truth table, properties and symbolic representation of NOT, AND, OR, NOR, NAND, EXOR, EXNOR gates. NOR and NAND gates as a universal gates. (C) Binary Arithmetic: Binary addition, binary subtraction using 1's and 2's compliment.	**(7.5Hrs)**
Unit – IV	(A) Network: Network terminology, Topologies: Linear, Circular, Tree and Mesh. Types of Networks: LAN, WAN, MAN. (B) Networking Devices: Repeaters, Bridges, Routers and Gateway. Modem for Communication between pc's, wi-fi network, Introduction of Bluetooth and Infrared devices. (C) Network Architecture: Peer-to-Peer, Client/Server Internet Protocols: TCP/IP, FTP, HTTP, HTTPS, Internet Addressing: IP Address, Domain Name, URL.	**(7.5Hrs)**

REFERENCES:

1	Information Technology Concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi].
2	Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai &Vikas Publishing House Pvt. Ltd, New Delhi].
3	Fundamental of Micropocessor by B Ram

IKS AVAILABLE WITH COMPUTER SCIENCE MAJOR		
Paper Code: B-CS116T	VEDIC MATHEMATICS	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OUTCOMES

This course will enable the students to

1. Improve speed and accuracy in numerical calculations
2. Acquire IQ skills and high-end technical knowledge
3. gain test taking skills & creativity of calculations

Unit No.	Content	
Unit - I	(i)Addition - Subtraction - Combined operations - Beejank (ii) Multiplication methods: Urdhwatiryagbhayam, Nikhilam, Ekanyunen, Ekadhiken, Antyayordashakepi. (iii) Vinculum - Operations. (iv) Awareness of 1 to 5 Vedic sutras as per Shankaracharya Bharthikrishan Teerthji Swamiji's book.	**(7.5Hrs)**
Unit – II	(i) Division methods : Nikhilam, Paravartya Yojayet, Dhwajank (ii) GCD and LCM (iii) Expression of GCD in terms of two numbers.	**(7.5Hrs)**
Unit – III	(i) Divisibility tests, Osculation & Reverse osculation. (ii) Division Algorithm, Quotient & Remainder. (iii) Duplex method.	**(7.5Hrs)**
Unit – IV	i) Squares & Square-roots for 6 digit number. (ii) Cubes & Cube-roots for 6 digit number, Contribution of Indian Mathematicians in Arithmetic.	**(7.5Hrs)**

REFERENCES:

1	Tirthaji B.K. (1965) Vedic Mathematics, MotilalBanarsidass
2	Bidder G.P. (1856) On Mental Calculation. Minutes of Proceedings, Institution of Civil Engineers (1855-56), 15, 251-280
3	Scripture E.W. (1891) American Journal of Psychology. Vol. IV 1-59
4	Mitchell F.D. (1907) American Journal of Psychology. Vol. XVIII 61-143
5	Aitken A.C. (1954) The Art of Mental Calculation: With Demonstrations. Transactions of the Society of Engineers. 45, 295-309
6	Dow A. (1991) A Unified Approach to Developing Intuition in Mathematics, Scientific Research on the Transcendental Meditation and TM-Sidhi Program Vol 5,3386-3398
7	Williams K.R. (1984) Discover Vedic Mathematics. Vedic Mathematics Research Group
8	Nicholas, Williams, Pickles (1984) Vertically and Crosswise. Inspiration Books

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SYLLABUS

SEMESTER II

DSC II FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-CS121T	**Title::** Programming in 'C	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. The objective of this course is to make the student understand programming language concepts, mainly control structures, reading a set of data, stepwise refinement, function, control structure and arrays.
2. After completion of this course, the student is expected to analyze the real life problem and write a program in 'C' language to solve problem. The main emphasis of the course is on problem solving aspect that is, developing proper algorithms.

OUTCOMES

By the end of this Programme, the students will be able to:

1. Understand programming structures like Sequence, Selection, Iteration and Modular.
2. Understand development tools such as algorithm, flowchart and pseudo code for any problem to solve them programmatically.
3. Understand basic concepts of programming in C such as character set, Operators, Functions etc.
4. Understand arrays, strings, functions, structures, unions and pointers.
5. Understand the file handling, sequential access and random access programmatically.

Unit No.	Content	No. of Hours
Unit - I	Programming Structure: Sequence, Selection, Iteration and Modular. Problem Solving techniques: Development Tools: Algorithm, Flowcharts and Pseudo code (Definition and its characteristics) Developing Algorithm and Drawing flowcharts	**(7.5Hrs)**
Unit – II	C Character set, Tokens, Identifier, Keywords, Variables, Data types, Qualifiers. Operators and Expressions: Arithmetic, Relational, Logical, Bit-Wise, Increment, Decrement, Conditional and Special operators. typedef, Type Conversion, Constants, Declaring Symbolic Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions: Maths, string handling Functions. Control Structure: Compound Statement, Selection Statement: if, if-else, Nested if, switch. Iteration statement: for, while, do...while, Nested loops, Jump statements: break, continue, goto (Special emphasis on problem solving)	**(7.5Hrs)**
Unit – III	Arrays: Need, Types: Single and Two Dimensional Array. Strings: Strings Manipulation, Arrays of Strings, Evaluation order Function: Function Components, Return Data type, Parameter Passing, Return by Reference, Default Arguments, Recursive Functions, Arrays with Functions, Storage Classes. (Special emphasis on problem Solving)	**(7.5Hrs)**
Unit – IV	Structure: Declaration, Definition, Accessing structure members, Initialization, Nesting of Structures. Union: Unions, Differences between Structure and Union Pointer: Introduction, Address Operator (&), Pointer variables, void pointers, Pointer Arithmetic, Pointers to Pointers. File handling: Hierarchy of File Stream Classes, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.	**(7.5Hrs)**

REFERENCES:	
1	The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.
2	Programming in C by E. Balagurusamy TMH Publications.
3	C Programming – KernighenRitche
4	Programming with C – Y. Kanetkar
5	C Programming – Holzner, PHI Publication.
6	Programming in C – Ravichandran

DSC LAB FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-ST122P	**PRACTICALS Based ON DSC I**	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

Practical No.	**Content**
1	Program to Compute Fibonacci series
2	Program to find if a given number is prime or not.
3	Program to accept a number and display it in words
4	Program to find the sum of digits of any entered no.
5	Program to reverse the digit.
6	Program to find the frequency of occurrence of a given number from an array of N elements.
7	Program to reverse the array.
8	Program to Insert an element in One dimensional Array at a given position.
9	Program to Delete an element from One dimensional Array.
10	Program to Arrange string data (name of students) in alphabetical order using bubble sort.
11	Program to search the element in an array of N elements using a) Linear search method b) Binary search
12	Program to a) Multiply two Two dimensional Array's (3 X 3 matrix) b) Find largest element in Two dimensional Array (3 X 3 matrix).
13	Program a) To Check if given String is Palindrome or not b) To calculate number of blanks, vowels and words from entered phrase.
14	Program to a) Compute Cosine series : cos x = 1- x^2/2! + x^4/4!-x^6/6!+ -- b) Compute Sine series : sin x = x- x^3/3!+ x^5/5! –x^7/7! + ---------
15	Program to find Factorial of a number using recursive function.
16	Program using function to find sum of two numbers a) With no argument & no return values (b) With argument & no return values (c) With argument & return values
17	Program to demonstrate passing structure to functions. Fields are empno, name, Basic a) Call by Value b) Call by reference
18	Program to a) swap values of two variables by passing pointers. b) Read two integers and determine bigger of the two with the help of function big() returning an integer pointer.
19	Create a sequential file and perform following operation fields are Roll, Name, M1, M2, M3 a) Add records b) Process & Display output.

VSC AVAILABLE WITH COMPUTER SCIENCE MAJOR / MINOR		
Paper Code: B-CS125P	Computer Animation	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

OBJECTIVES

1. To Understand the concept of 2D and 3D Animation.
2. To Execute creative concepts and ideas through a variety and combination of techniques including hand drawn, computer generated, 2D and 3D storyboards and animatics.
3. To Understand how animation works.
4. 4. To Understand the basic concepts of multimedia technology which will help them to get started easily in multimedia.

OUTCOMES

After completion of this course, students will be able to:

1. Get knowledge about various terms like, images, text, fonts, file formats. Understanding these things is very necessary.
2. Produce traditional style animation as well as puppet animation and the knowledge of the principles of animation to be built upon in subsequent courses leading up to the Portfolio course.
3. Apply skills learned in this class in other areas including motion graphics, stop motion and basic traditional animation

Unit No.	Content	
Unit - I	Animation, Introduction to 2D and 3D Animation. Advantages of animation, Different tools of 2D Animation. GIMP Features and Capabilities, Toolbox, Image Window, Dialog and Docking, Working with images, Pencil2D , Overview of Pencil2D, Traditional Animation Workflows, How to rotate image, Scrolling background in Camera layer	**(15Hrs)**
Unit – II	Opentoonz , Production Workflow, Interface Overview, Managing Projects, Setting Up a Scene, Scanning Paper Drawings, Cleaning-up Scanned Drawings, Drawing Animation Levels, Editing Animation Levels, Managing Palettes and Styles, Painting Animation Levels, Working in Xsheet/Timeline, Creating Movements, Editing Using Spreadsheet and Curves, Creating Cutout Animation, Create animations using Plastic tool, Applying Effects, Using the Particles Effect, Previewing and Rendering	**(15Hrs)**
Unit – III	Blender, History and Installation, Interface : Blender Interface, Adding New Objects, Moving Things Around, Modeling : Mesh, Edit Mode, Sculpt Mode, Retopology Lighting and Procedural Textures : Setting Up a Basic Scene, The Scene Camera, Procedural Materials and Textures., UV Mapping : Creating a UV Map, Texture Painting, Projection Painting, Normal Maps and Bump Maps Curves and NURBS : Metaballs, Curves, Spins, Nurbs,	**(15Hrs)**
Unit – IV	Basic Rigging and Animation : Keyframing with the Timeline, The Dopesheet ., Parenting, Graph Editor, Pivot Point: The Center of Rotation, Basic Tracking: Eyes That Follow, Rigging with Bones, Rigging a Simple Character, Advanced Rigging ..: Forward Kinematics vs. Inverse Kinetics, Blender 2.5 Rigs, Walk Cycles., Shape Keys, Lip Syncing. Making Movies : Disabling, Color Management, Rendering Formats, Alpha, Lighting Adjustments, The Video Sequence Editor, Crash Management and Rendering Speed, Introduction to Game Engine	**(15Hrs)**

REFERENCES:	
1	https://docs.gimp.org/odftest/en.pdf
2	https://opentoonz.readthedocs.io/en/latest/using_the_toonz_farm.html
3	https://www.pencil2d.org/doc/tutorials
4	Beginning Blender Open Source 3D Modelling, Animation, and Game Design, Lance Flavell, Apress
5	https://www.academia.edu/7984869/Beginning_Blender_Open_Source_3D_Modeling_Animation_and_Game_Design_Companion_eBook_Available_Full_Color_Inside_BOOKS_FOR_PROFESSIONALS_BY_PROFESSIONALS_Beginning_Blender_Open_Source_3D_Modeling_Animation_and_G ame
6	Design Reference Book : Learning Blender A Hands-On Guide to Creating 3D Animated Characters, Oliver Villar Blender Basics Classroom Tutorial Book 4th Edition, James Chronister
7	https://www.cdschools.org/cms/lib04/pa09000075/centricity/domain/81/blenderbasics_4thedition201 1.pdf
8	Blender 3D Basics Beginner's Guide: A quick and easy-to-use guide to create 3D modeling and animation using Blender 2.7, Gordon Fisher

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS123T	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. The objective of this course is to make the student understand programming language concepts, mainly control structures, reading a set of data, stepwise refinement, function, control structure and arrays.
2. After completion of this course, the student is expected to analyze the real life problem and write a program in 'C' language to solve problem. The main emphasis of the course is on problem solving aspect that is, developing proper algorithms.

OUTCOMES

By the end of this Programme, the students will be able to:

1. Understand programming structures like Sequence, Selection, Iteration and Modular.
2. Understand development tools such as algorithm, flowchart and pseudo code for any problem to solve them programmatically.
3. Understand basic concepts of programming in C such as character set, Operators, Functions etc.
4. Understand arrays, strings, functions, structures, unions and pointers.
5. Understand the file handling, sequential access and random access programmatically.

Unit No.	Content	No. of Hours
Unit - I	Programming Structure: Sequence, Selection, Iteration and Modular. Problem Solving techniques: Development Tools: Algorithm, Flowcharts and Pseudo code (Definition and its characteristics) Developing Algorithm and Drawing flowcharts	**(7.5Hrs)**
Unit – II	C Character set, Tokens, Identifier, Keywords, Variables, Data types, Qualifiers. Operators and Expressions: Arithmetic, Relational, Logical, Bit-Wise, Increment, Decrement, Conditional and Special operators. typedef, Type Conversion, Constants, Declaring Symbolic Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions: Maths, string handling Functions. Control Structure: Compound Statement, Selection Statement: if, if-else, Nested if, switch. Iteration statement: for, while, do...while, Nested loops, Jump statements: break, continue, goto (Special emphasis on problem solving)	**(7.5Hrs)**
Unit – III	Arrays: Need, Types: Single and Two Dimensional Array. Strings: Strings Manipulation, Arrays of Strings, Evaluation order Function: Function Components, Return Data type, Parameter Passing, Return by Reference, Default Arguments, Recursive Functions, Arrays with Functions, Storage Classes. (Special emphasis on problem Solving)	**(7.5Hrs)**
Unit – IV	Structure: Declaration, Definition, Accessing structure members, Initialization, Nesting of Structures. Union: Unions, Differences between Structure and Union Pointer: Introduction, Address Operator (&), Pointer variables, void pointers, Pointer Arithmetic, Pointers to Pointers. File handling: Hierarchy of File Stream Classes, Opening & closing a file, Testing for errors, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.	**(7.5Hrs)**

REFERENCES:	
1	The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.
2	Programming in C by E. Balagurusamy TMH Publications.
3	C Programming – KernighenRitche
4	Programming with C – Y. Kanetkar
5	C Programming – Holzner, PHI Publication.
6	Programming in C – Ravichandran

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS122T	WEB TECHNOLOGIES	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To comprehend and analyse the basic concepts of web programming and internet protocols.
2. To describe how the client-server model of Internet programming works.
3. To demonstrates the uses of HTML and DHTML.

OUTCOMES

After completing this course satisfactorily, a student will be able to:

1. Differentiate web protocols and web architecture.
2. Apply HTML and DHTML effectively to create websites.

Unit No.	Content	
Unit - I	Introduction to Internet, History of Internet, Internet users, Internet working, Information on Internet, Requirements for connecting to Internet, Basic Internet Terms, Introduction to world wide web, Evaluation of world wide web, basic features, web browsers, popular web browsers, web servers, HTTP, URL, Search Engines, Search Engines categories, how to use Search Engines, Searching criterion.	**(7.5Hrs)**
Unit – II	HTML: Introduction, Objective, HTML Browsers, Windows Switching, HTML Command Tags, URLs, links, new web page creation, main body of the text, putting headers, adding paragraph , formatting text in HTML and font mechanism, Color settings, superscripts and subscripts and other manipulations on text and paragraphs, using directory and menu lists, creation of links, inserting graphics, using images, all manipulations on tables and its display, Detailed working with forms, allowing visitors to upload files, active images ,working with frames & framesets, Frames handling, scroll bars, alternatives to frames,	**(7.5Hrs)**
Unit – III	Introduction to browsers, Working with e-mail, Parts of e-mail text, working with messages. DHTML: using DHTML in internet explorer, heading and horizontal line, hidden message, the message at the center of the page, moving boxes ,changeable box.	**(7.5Hrs)**
Unit – IV	Cascading style sheets Introduction to css, creating style sheets, common tasks with CSS, Colors, the font -family, font metrics ,length units ,absolute units ,relative units ,the pixel unit ,percentages as values ,keywords as values, various properties such as the font -size property, font -size property etc, Assigning classes ,tags and attributes for applying classes, applying classes to an HTML tag, applying classes to other document parts ,the layer tag, CSS Tags	**(7.5Hrs)**

REFERENCES:	
1	Internet and web design by R Bangia, Second edition , firewall media
2	Multimedia and Wed technology by R Bangia
3	Internet and web designing by ITELS (Macmillan)
4	Web Enabled Commercial Application Development Using HTML, DHTML, JS, Perl by Ivan Bayross
5	Deitel, Deitel & Nieto, Internet and Worldwide Web how to Program, Pearson Education, PHI.
6	Internmet Programming with VBScript and Java Script. Kathhleen Kalata, (Thomsaon Publication)
7	Programming the World Wide Web By. Robert W. Sebesta. (Pearson)
8	Web Technology Theory and Practice By: M Srinivasan (Pearson Publication)

IKS AVAILABLE WITH COMPUTER SCIENCE MAJOR		
Paper Code: B-CS126T	INDIAN ASTRONOMY	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OUTCOMES

This course will enable the students to understand that

1. It is possible to create a map of the intellectual growth of a culture usingastronomy as a probe.
2. The growth of Indian astronomy occurs in distinct stages analogous to phasetransitions of the evolution of cultures
3. Indian Astronomy therefore provides an excellent window to the pastdramatic transitions.

Unit No.	Content	
Unit - I	Astronomy in Prehistoric Era, Astronomy in Vedic Era, Vedang Jyotish, Astronomical References In Religious Scriptures, Astronomies of the West	**(7.5Hrs)**
Unit – II	Arya Bhatta, Panch Siddhantika of Varahamihira, Surya Siddhanta Varahamihira to Bhaskar Acharya-II, Siddhant Shiromani of Bhaskar Acharya-II, Bhaskar Acharya-II to Jai Singh, Jai Singh and his Observatories.	**(7.5Hrs)**
Unit – III	After Jai Singh, Interaction with the Astronomies of the World, Modern Era Astronomy , Our Universe, Cosmology	**(7.5Hrs)**
Unit – IV	Panchang Horoscope and Astrology , Siddhantas, Karnas and Koshtakas, Observational Instruments of Indian Astronomy	**(7.5Hrs)**

REFERENCES:

1	The Story Of Astronomy In India, Chander Mohan, Pothi.com
2	Indian Astronomy: An Introduction. Front Cover · S. Balachandra Rao.Universities Press, 2000
3	Astronomy in India: A Historical Perspective, Thanu Padmanabhan,Springer Science & Business Media
4	Hindu Astronomy, W. Brennand, Alpha Editions
5	Origin and Growth of Astronomy in India, https://www.tifr.res.in/~archaeo/FOP/FOP%20pdf%20of%20ppt/Vahia%20Origin%20of%20Astronomy.pd