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 3 OF 2024 ISSUED BY THE INSTITUTE OF SCIENCE,

NAGPUR AS PER NEP 2020

(TO BE IMPLEMENTED FROM ACADEMIC YEAR 2023-2024)

COMPUTER SCIENCE - MINOR

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 software.
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 provide opportunity for the study of modern methods of information processing and its applications.
5. To develop among students the programming techniques and the problem solving skills through programming
6. To prepare students who wish to go on to further studies in computer science and related subjects.
7. 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. Programming a computer: Exhibiting strong skills required to program a computer for various issues and problems of day-to-day scientific applications.
4. Application Systems Knowledge: Possessing a minimum knowledge to practice existing computer application software.
5. Communication: Must have a reasonably good communication knowledge both in oral and writing.
6. 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.
7. Lifelong Learning: Should become an independent learner. So, learn to learn ability.
8. 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

Computer Science as Minor / Minor Subject

Table 1: B.Sc. Semester I

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	GE	B-CS111T	Refer to GE Basket		2
		B-CS112T	Refer to GE Basket		2
2	VSEC	B-CS113P	Refer VSC Basket		2
		B-CS114P	Refer SEC Basket		2
Total					8

Table 2: B.Sc. Semester II

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	GE	B-CS121T	Refer to GE Basket		2
		B-CS122T	Refer to GE Basket		2
2	VSEC	B-CS123P	Refer VSC Basket		2
		B-CS124P	Refer SEC Basket		2
Total					8

Table 3: B.Sc. Semester III

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	Minor	B-CS231T	Paper 1:-Refer Minor Basket		2
		B-CS232T	Paper 2:-Refer Minor Basket		2
		B-CS233P	Minor Lab		2
2	GE	B-CS234T	Refer to GE Basket		2
3	VSEC	B-CS235P	Refer VSC Basket		2
Total					10

Table 4: B.Sc. Semester IV

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
2	Minor	B- CS 241T	Paper 1:-Refer Minor Basket		2
		B- CS 242T	Paper 2:-Refer Minor Basket		2
		B- CS 243P	Minor Lab		2
3	GE	B- CS 244T	Refer to GE Basket		2
4	VSEC	B- CS 245P	Refer SEC Basket		2
Total					10

Table 5: B.Sc. Semester V

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	Minor	B-CS351T	Paper 1:-Refer Minor Basket	5.5	2
		B- CS352T	Paper 2:-Refer Minor Basket		2
		B-S CS353P	Minor Lab		2
4	VSEC	B-S CS354P	Refer VSC Basket		2
Total					8

Table 6: B.Sc. Semester VI

Sr No	Course Category	Course Code	Name of the course (Title of the Paper)	Level	Total Credit
1	Minor	B-CS361T	Paper 1:-Refer Minor Basket	5.5	2
		B-CS362T	Minor Lab		1
4	VSEC	B-CS363P	Refer VSC Basket		2
Total					5

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-CS113P	Office Automation	2	4
2	I	II	B-CS123P	Computer Animation	2	4
3	II	III	B-CS235P	Web design using HTML and DHTML	2	4
4	III	V	B-CS354P	Web Development using Java	2	4
5	III	VI	B-CS363P	Shell Programming	2	4

Skill Enhancement Courses (SEC) available with any subject (other than 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-CS114P	Web Development	2	4
2	I	II	B-CS124P	Android App Development OR Tally	2	4
3	II	IV	B- CS 245P	Desk Top Publishing	2	4

Computer Science as a Minor Subject and any other subject as a Major (Offered by the Department of Computer Science):

S.No.	Year	Semester	Course Code	Name of the paper (Theory / Practical)	Credits	Theory / Practical Hrs
1	II	III	B-CS231T	Paper 1:- Programming in 'C	2	2
2			B-CS232T	Paper 2:- **Fundamentals of Information Technology**	2	2
3			B-CS233P	Minor Lab based on Paper I and II	2	4
4	II	IV	B- CS 241T	Paper 1:- Object Oriented Programming using 'C ++'	2	2
5			B- CS 242T	Paper 2:- Operating Systems	2	2
6			B- CS 243P	Minor Lab based on Paper I and II	2	4
7	III	V	B-CS351T	Paper 1:- Data Structures	2	2
8			B- CS352T	Paper 2:- Linux Operating System	2	2
9			B-S CS353P	Minor Lab based on Paper I and II	2	4
10	III	VI	B-CS361T	Paper 1:- Java Programming	2	2
11			B-CS362T	Minor Lab based on Paper I	1	2

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-CS111T	Office Automation	2	2
2	I	I	B-CS112T	Fundamentals of Information Technology	2	2
3	I	II	B-CS121T	PROGRAMMING IN 'C'	2	2
4	I	II	B-CS122T	WEB TECHNOLOGIES	2	2
5	II	III	B-CS234T	Data Base Management System	2	2
6	II	IV	B- CS 244T	Cyber security	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

VSC AVAILABLE WITH COMPUTER SCIENCE MAJOR / MINOR		
Paper Code: B-CS113P	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

SEC AVAILABLE WITH ANY SUBJECT (OTHER THAN COMPUTER SCIENCE) AS MAJOR OR MINOR		
Paper Code: B-ST114P	WEB DEVELOPMENT	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

Unit No.	Content
1	Basics in Web Design: - Brief History of Internet, What is World Wide Web, URL, Domain, What is Web Page and a Website, Internet Browser, HTML, CSS Editors Introduction to HTML:- Brief Introduction of HTML, HTML Tags, Basic structure of an HTML document, Heading-Paragraphs, Line Breaks
2	Elements of HTML: Introduction to elements of HTML, Working with Text, Formatting Tags, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls, Marquee Elements
3	Introduction to Cascading Style Sheets:- Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin, properties), Navigation Bar, CSS Color, Creating page Layout and Site Designs.
4	Java Script: - What is JavaScript, Java "vs" JavaScript, Variables, Datatypes, Functions, Loops, Decision Making, Form Validation

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS111T	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-CS112T	**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

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SYLLABUS

SEMESTER II

VSC AVAILABLE WITH COMPUTER SCIENCE MAJOR / MINOR		
Paper Code: B-CS123P	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

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SEC AVAILABLE WITH ANY SUBJECT (OTHER THAN COMPUTER SCIENCE) AS MAJOR OR MINOR		
Paper Code: B-CS124P	**Android App Development**	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

Unit Practical No.	**Content**
1	**Android Introduction:-** What is Android, History and Version, Android Architecture, Core Building Blocks, Android Emulator, Install Android, Setup Eclipse, Hello Android example, Internal Details, AndroidManifest.xml
2	**Basic UI design: -** Form widgets , Text Fields, Layouts, [dip, dp, sip, sp] versus px
3	**Menu: -**Option menu, Context menu, Sub menu, menu from xml, menu via code
4	**List of Practicals** 1) create a hello world project 2) create a login form Application 3) create a calculator Application 4) create a counter Application 5) create an application with three option button, on selecting a button colour of the scree will change. 6)Create an application using Image view. 7) create an application Using List view 8) create an application using Spinner 9) create an application using Auto complete TextView.

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS121T	PROGRAMMING IN 'C'	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in C language).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To implement operations on arrays, strings , structures, unions , functions and file handling.

OUTCOMES

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

1. Write simple algorithms for arithmetic and logical problems.
2. Write the C code for a given problem
3. Perform input and output operations using programs in C
4. Write programs that perform operations on arrays, strings , structures, unions , functions and file handling.

Unit No.	Content	
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	**(7.5Hrs)**

	classes, applying classes to an HTML tag, applying classes to other document parts ,the layer tag, CSS Tags	

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)

INSTITUTE OF SCIENCE, NAGPUR

(An Autonomous Institute of Government of Maharashtra)

SYLLABUS

SEMESTER III

MINOR I FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-CS231T	**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	

MINOR II FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-ST232T	**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	
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

MINOR LAB FOR COMPUTER SCIENCE MAJOR		
Paper Code: B-ST233P	**PRACTICALS Based ON Minor I & II**	
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-CS235P	Web design using HTML and DHTML	
Course type- Practical	**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)

GE / OE AVAILABLE WITH ANY MAJOR SUBJECT OTHER THAN FACULTY SCIENCE AND TECHNOLOGY		
Paper Code: B-CS234T	**Title::** Data Base Management System	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database Modeling, relational, hierarchical, and network models
3. To develop an understanding of essential Properties of DBMS concepts such as database security, integrity, concurrency
4. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS.

OUTCOMES

1. This course will enable the students to
2. Describe the fundamental elements of relational database management systems
3. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL
4. Design ER-models to represent simple database application scenarios
5. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data
6. Improve the database design by normalization
7. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing

Unit No.	Content	No. of Hours
Unit - I	DBMS : Definition: Databases, DBMS, Problems with traditional file processing system, Objectives of the database systems, Three level architectures of DBMS, Component of DBMS, Database Administrator, Database Users, Data model, Different types of data models, Concepts of Hierarchical, Network Models.	**(7.5Hrs)**
Unit -II	E-R Models : Basic Concepts, Entity, Attributes, Relation Ship, Mapping, Keys, Weak and Strong Entity Set, Problems on E-R Diagrams, Extended E-R Features: Specialization, Generalization, Aggregation, Problems on Reduction of an E-R Schema to Tables, Tabular representation of Strong, Weak entity Sets and Relationship Sets.	**(7.5Hrs)**
Unit - III	Relational Model: Structure, Relational Algebra, Fundamental Operations, Set – Intersection, Natural Join, Division and Assignment Operation. Extended Relational Algebra Operations, Aggregate Functions.	**(7.5Hrs)**

Unit - IV	Functional Dependency: Functional Dependency, Fully Functional Dependency, Partial Dependency, Transitive Dependency, Multi Valued Dependency. Normalization, Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF, 5NF). Problems on Normal forms.	**(7.5Hrs)**
REFERENCES:		
1	Data Base System Concepts By A SilbersChatz By Henry Korth And S.Sudarshan [Mcgraw-Hill ltd. New Delhi] 3rd Edition.	
2	Introduction to Data Base Management by NAVEEN PRAKASH [Tata McGrawHill ltd.]	
3	Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.	
4	Raghu Ramakrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000	
5	Muzumdar, Introduction to Database Management Systems. TMH	

INSTITUTE OF SCIENCE, NAGPUR

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SYLLABUS

SEMESTER IV

Minor I FOR COMPUTER SCIENCE MINOR		
Paper Code: B-CS241T	**Title::** Object Oriented Programming using '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 advanced programming language concepts, and apply those concepts to solve complex real-life problems.
2. Also, the advanced topics in C++ language are covered

OUTCOMES

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

1. Understand key structured programming, constructs declaration sequence, selection, repetition evaluating expression.
2. Understand C++ functions and the concepts related to good modular designs.
3. Understand pointers and reference parameters; understand the creation of class and objects.
4. Handle files programmatically creating dynamic objects.
5. Understand inheritance virtual functions, need and pure virtual functions.
6. Understand mechanism of online function, constructors, destructors, operator overloading and exception handling.

Unit No.	Content	No. of Hours
Unit - I	**A) Object Oriented Methodology-** Elements of Object Oriented programming, Objects, Classes, OOPs features. **(B) Classes & Objects-** Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members.	**(7.5Hrs)**
Unit – II	**A) Constructors & Destructors-** Introduction, Parameterized Constructors, Constructor Overloading, Constructors with Default Arguments, Copy Constructor, Destructor, Order of Construction and Destruction, Static data members with Constructor and Destructors. (**B) Operator Overloading-** Definition, Overloadable Operators, Unary Operator Overloading, Unary & Binary overloading, Rules for Operators Overloading	**(7.5Hrs)**
Unit – III	**(A) Dynamic Objects-** Pointers to Objects, Creating and Deleting Dynamic Objects: New and Delete operators, Array of Objects, Array of Pointers to Objects, Pointers to Object Members, this Pointer. **(B) Inheritance-** Defining, Abstract classes, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Constructor and Destructor in Derived Classes.	**(7.5Hrs)**

Unit – IV	**(A) Virtual Functions-** Need for Virtual Functions, definition, Pure Virtual Functions, Abstract Classes, Rules for Virtual Functions. **(B) Exception Handling-** Exception Handling Model, List of Exceptions, Handling Uncaught Exceptions, Fault Tolerant Design Techniques, Memory Allocation Failure Exception, Rules for Handling Exception Successfully.	**(7.5Hrs)**
REFERENCES:		
1	Mastering C++ by K R Venugopal Tata McGraw-Hill , New Delhi	
2	Mastering C++ by K R Venugopal Tata McGraw-Hill , New Delhi.	
3	The C++ Programming Language –Bjarne Stroustrup	
4	Programming with C++ - Ravichandran	
5	Programming with C++ - Robert Lafore	
6	Object Oriented Programming with C++ by E. Balagurusamy, McGraw Hill	

Minor II FOR COMPUTER SCIENCE MINOR		
Paper Code: B-ST242T	**Title::** OPERATING SYSTEMS	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

The objective of this course is

1. To make student learn the basic functions & structure of operating systems and various commands & operations.
2. To understand design issues related to process management and various related algorithms
3. To understand design issues related to memory management and various related algorithms
4. To understand design issues related to File management and various related algorithms

OUTCOMES

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

1. Understand the basic of Structure of Operating System, Characteristics of Modern OS
2. Understand the anatomy of Process Management, CPU Scheduling Algorithm
3. Understand the concept of deterministic Modelling, Dead Lock Prevention, Dead Lock Detection, Recovery from Deadlock
4. Explain paging, segmentation, Segmentation with paging. Protection 5. Understand file management, Buffering.

Unit No.	Content	
Unit - I	(A) Operating System:- Structure of Operating System, Operating System functions, Characteristics of Modern OS. (B) Process Management- Process states, Creation, Termination, Operations on Process, Concurrent process, Processes Threads, Multithreading, Micro Kernels (C) CPU Scheduling- Schedulers, Scheduling Methodology, CPU Scheduling Algorithm: FCFS, SJF, RR, Priority Scheduling.	**(7.5Hrs)**
Unit – II	(A) Performance comparison- Deterministic Modeling, Queuing analysis, Simulators. (B) Deadlock and Starvation- Resource Allocation Graph, Conditions for Dead Lock, Dead Lock Prevention, Dead Lock Detection, Recovery from Deadlock.	**(7.5Hrs)**
Unit – III	(A) Memory Management- Logical Vs. Physical Address Space, Swapping, Memory Management Requirement, Dynamic Loading and Dynamic Linking, (B) Memory Allocation Method- Single Partition allocation, Multiple Partitions, Compaction, paging, segmentation, Segmentation with paging. Protection.	**(7.5Hrs)**

Unit – IV	(A) I/O Management- I/O hardware, I/O Buffering, Disk I/O, Raid, Disk Cache. (B) File Management- File Management system, File Accessing Methods, File Directories, File Allocation Methods, File Space Management, Disk Space Management, Record blocking. (C) Protection Mechanisms- Cryptography, Digital Signature, User Authentication.	**(7.5Hrs)**

REFERENCES:

1	Operating System Concept : Silbershaz (Addision Education)
2	Operating Systems - H.M. Deitel - Addision Wesley
3	Operating Systems- John J. Donoven.
4	Operating System : A.S.Godbole (TMH
5	Modern Operating Systems : Tenenenbaum (Pearson Education
6	Operating System : Peterson

MINOR LAB FOR COMPUTER SCIENCE MINOR		
Paper Code: B-ST243P	**PRACTICALS Based ON Minor I & II**	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 60**

Practical No.	**Content**
1	a) Write a program that declares a class, object and also it access the data member of it‟s class. b) b)Write an applet that accepts a value from the user and display it.
2	a) Write a program that accept marks of 5 subject, calculate total, percentage and display the grade according to their percentage. b) Write a program that will print the multiplication table from 1 to 10.
3	a) Write an program to accept a set of values from the user into an array, display the values as well as their average. b) Accept string into a text field, sort the characters in the string and display the sorted string in another text field.
4	a) Write a program to demonstrate the overloading & constructor. . b) Write an applet that accepts two numbers from the user and display all the numbers between them.
5	a) Write a program to demonstrate the single inheritance. b) Write an applet to accept ten numbers into array, sort the array and display the sorted array. Accept the ten numbers into the ten different text fields. c) Write a program to create a multiple selection list and also display the list of items selected by the user.
6	a) Write an applet to demonstrate the user menu Bar. b) Write a sample program that will convert the applet to application. c) Write a program to demonstrate the Interfaces.

SEC FOR COMPUTER SCIENCE MINOR		
Paper Code: B- CS245P	Desk Top Publishing	
Course type- Practical	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. To understand the fundamentals & concepts of Page Maker
2. To give the students a hands-on experience on Page Maker
3. To understand the fundamentals & concepts of Adobe Photoshop
4. To give the students a hands-on experience on Adobe Photoshop. Course

OUTCOMES

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

1. understand the fundamentals & concepts of Page Maker
2. create book works, building booklets.
3. create animations
4. work with multiple layers

Unit No.	Content	
Unit - I	Page Maker: Creating & opening publications, using the tool box, working with Palettes, text & Graphics, starting a publication from a template, saving & closing a publication Drawing & Shaping Objects: Positioning ruler guides, typing text, formatting graphics, creating columns, creating styles, changing type style & alignment, rotating & moving of text block & graphics , placing text file ,setting tab, indents, leaders, copying graphic between publications ,positioning & resizing the logo.	**(7.5Hrs)**
Unit – II	Page Maker: Setting up pages, changing document setup, using master pages, choosing a measurement system & setting up rulers, adjusting layout, numbering pages, rearranging pages, creating running header & footers, importing text, threading text blocks, balancing columns, edit story, customizing the dictionary, hyphenation, layers, frames, locking object, wrapping text around graphics, cropping a graphic	**(7.5Hrs)**
Unit – III	Photoshop: Introduction to Adobe Photoshop, History of Photoshop, Hardware requirements of Adobe Photoshop, installation of Adobe Photoshop, Features of Photoshop, Interface Layout of Photoshop, Fundamentals: Digital Image, pixels, resolution, DPI, raster images/bitmaps, vector images/graphics, various file formats: PSD, JPEG, GIF, TIF, PNG etc., colour modes Exploring the workspace: Application bar, Menu Bar, Options Bar, Workspace ,Document Window, Document ,Title Bar, Status Bar, Toolbox.	**(7.5Hrs)**
Unit – IV	Photoshop: Getting Familiar with Palettes: layers, channels, colors, history, Opening an existing file, Creating a new document, Saving files, Reverting Files, Closing Files, Getting Familiar with different Workspaces, Selecting a Workspace, Saving & Deleting Workspace & quitting the Application, Tools: brushes, Move Tool, Eyedropper Tool, Zoom Tool, Hand Tool, Type Tool, Quick Selection Tool Editing Images, Making Colour adjustments, working with Selection tools: Marquee Tool, Lasso Tool, Magic Wand Tool, making a selection based on colour Range, Modifying a Selection.	**(7.5Hrs)**

REFERENCES:	
1	Desk Top Publishing from A to Z by Bill Grout and Osborne, McGraw Hill
2	Desk Top Publishing for PC user by Houghton, Galgotia public.
3	Adobe Pagemaker 6.5 by Shashank Jain and Satish Jain, BPB public.
4	Desk Top Publishing on PC by M. C. Sharma, BPB public.
5	Adobe Photoshop CS2 Classroom, Adobe Press

GE / OE FOR COMPUTER SCIENCE MINOR		
Paper Code: B- CS 244T	**Title:: Cyber security**	
Course type- Theory	**No. of credits – 2**	**No. of contact hours – 30**

OBJECTIVES

1. Learn the foundations of Cyber Security and threat landscape.

2. To equip students with the technical knowledge and skills needed to protect and defend against cyber threats.

3. To develop skills in students that can help them plan, implement, and monitor cyber security mechanisms to ensure the protection of information technology assets.

4. To expose students to governance, regulatory, legal, economic, environmental, social and ethical contexts of Cyber Security.

5. To expose students to responsible use of online Social media network.

OUTCOMES

a. Understand the Cyber Security threat landscape.

b. Develop a deeper understanding and familiarity with various types of cyberattacks, cybercrimes, vulnerabilities and remedies thereto.

c. Analyse and evaluate existing legal framework and laws on Cyber Security.

d. Analyse and evaluate the digital payment system security and remedial measures against digital payment frauds.

e. Analyse and evaluate the importance of personal data its privacy and security.

f. Analyse and evaluate the security aspects of social media platform and ethical aspects associated with use of social media.

g. Analyse and evaluate the cyber security risks.

h. Based on the Risk assessment, plan suitable security controls and audit and compliance.

Unit No.	Content	No. of Hours
Unit - I	Defining Cyberspace and Overview of Computer and Webtechnology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of Cyber Security, Issues and challenges of Cyber Security	**(7.5Hrs)**
Unit -II	Classification of cybercrimes, Common cybercrimescybercrime targeting computers , cybercrime against woman and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks., Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation Students, at the end of this module, should be able to understand the cybercrimes, their nature, legal remedies and as to how report the crimes through available platforms and procedures. Page 4 of 10 measures, Legal perspective of cybercrime, IT Act,2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber Security in India	**(7.5Hrs)**

Unit - III	Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies	**(7.5Hrs)**
Unit - IV	Electronic Commerce definition, Main components of ECommerce, Elements of ECommerce security, ECommerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payment related common frauds and preventive measures. RBI guidelines on digital payment and customer protection in unauthorised banking transactions. Relevent provisions of Payment settlement Act,2007	**(7.5Hrs)**
REFERENCES:		
1	Cyber Crime Impact in the New Millennium, by Marine R. C, Auther Press.	
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd.	
3	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform.	
4	Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.	
5	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.	
6	Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.	
7	Fundamentals of Network Security by E. Maiwald, McGraw Hill.	