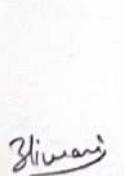


Part A: Introduction			
Program: Certificate Course	Class: BCA 1 <sup>st</sup> Semester BCASCC-1T (CASC-1T)	Year: 2023	Session: 2023-24
1 Course Code			
2 Course Title	Computer Fundamentals		
3 Course Type	Core Course		
4 Pre-requisite (if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Understand the concept of input and output devices and the basic terminologies used in the computer.</li> <li>Understand the Programming, flow chart symbols, complete and correct flow chart algorithms, create a program based on a flow chart.</li> <li>Identify categories of programs, system software and applications. Organize and work with files and folders</li> <li>Utilize the Internet Web resources and evaluate on-line e-business system.</li> <li>Solve common business problems using appropriate Information Technology applications and systems.</li> </ul>		
6 Credit Values	03		
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

#### Part B: Content of the Course

Total No. of Teaching-learning - Hours- 45 / Periods-60

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>Basics of Computer:</b> Brief History of Computers, Technical Computer Generations, Types of Computers, Computer Hardware, CPU and its components, Basic input and output devices, Types of Printers, Features of Printers; Plotters, Features of plotters, Memory; Types of Computer Memory, Storage devices: Hard Disk, Floppy Diskette, Data Retrieval and Characteristics; Optical Technology; CD-ROM, CD-ROM operation, DVD-Drive, Tape drive, Pen drive, etc	12 hours
II	<b>Computer Software, Operating System, DOS:</b> Software and its need, Types of Software's: system software, application software, utility software, firmware, Operating System, Functions of operating system (only list), Compiler, Assembler, Interpreter, Debugger, Loader, and Linker; Booting process (with BIOS & POST), DOS, Internal and External commands of MS-DOS.	11 hours
III	<b>Program Planning &amp; Computer Languages:</b> Planning the computer program: algorithm, representation of algorithms, flowchart, flowchart symbols, advantages and limitations of flowchart, Pseudocode: definition, advantages and limitations of pseudocode. Introduction and evolution of programming language, Types of programming language, characteristics of a good programming language, Machine language, Assembly language, High level languages	11 hours
IV	<b>Internet &amp; Application:</b> Internet: Definition, history of internet, basic services of internet,	11 hours

	uses of internet, internet search engine; World Wide Web. Internet security: firewall, encryption. Web browser. Latest IT trends: Artificial intelligence, Data mining, Cloud computing	
<b>Keywords:</b>	Operating System, Input & Output Devices, Current Trends	
<b>Part C: Learning Resource</b>		
Text Books, Reference Books, Other Resources		
Suggested Readings:		
<b>Text Books Recommended-</b>		
<ol style="list-style-type: none"> <li>1. "Computer Fundamentals", P.K. Sinha, BPB Publication</li> <li>2. "Fundamental of computer ", V. Rajaraman, PHI Publication</li> <li>3. "Introduction to information technology", V. Rajaraman, PHI ublication</li> <li>4. "Information Technology today", S. jaiswal</li> <li>5. "Fundamental of IT", Leon and Leon , Leon Tec world</li> <li>6. "Introduction to Information Technology", Aksoy and Denardis, Cengage learning</li> </ol>		
<b>Online resources:</b>		
<ol style="list-style-type: none"> <li>1. <a href="https://www.ndl.gov.in/">https://www.ndl.gov.in/</a> (National Digital Library of India)</li> <li>2. <a href="https://www.swayam.gov.in">https://www.swayam.gov.in</a> ( SWAYAM PORTAL)</li> <li>3. <a href="https://www.doabooks.org/">https://www.doabooks.org/</a> ( Directory of Open Access Books)</li> <li>4. <a href="https://nptel.ac.in/">https://nptel.ac.in/</a> National Programme on Technology Enhanced Learning (NPTEL)</li> <li>5. <a href="https://epgp.inflibnet.ac.in/">https://epgp.inflibnet.ac.in/</a> E-PG Pathshala</li> <li>6. <a href="http://cec.nic.in/cec/">http://cec.nic.in/cec/</a> (e-Content Courseware in UG Subjects)</li> <li>7. <a href="https://egyankosh.ac.in/">https://egyankosh.ac.in/</a> ( E-Gyankosh)</li> </ol>		

<b>PART - D: Assessment and Evaluation</b>		
Suggested Continuous Evaluation Methods:		
<b>Maximum Marks:</b>	100 Marks	
<b>Continuous Comprehensive Evaluation (CCE)</b>	20 Marks	
<b>Semester End Exam (SEE):</b>	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

  
 Dr. B. Venkateswaran

  
 Mr. S. Suresh

  
 Mr. R. Balaji

Part A: Introduction				
Program: Certificate Course	Course Code	Class: BCA 1 <sup>st</sup> Semester	Year: 2023	Session: 2023-24
1	Course Title	BCASCC -1P <u>(CASC- 1P)</u>		
2	Course Type	Laboratory Course		
3	Pre-requisite(if any)	As per Govt. Norms		
4		<ul style="list-style-type: none"> <li>• Learn basic operations/ functioning of Computer</li> <li>• Able to learn operating system (Windows/DOS)</li> <li>• Able to learn basic computer configuration and settings.</li> <li>• Able to create algorithms and design flowchart.</li> </ul>		
5	Credit Values	01		
6	Total Marks	Max. Marks: 50	Min Passing Marks: 20	
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#### Part B: Content of the Course

Total No. of Teaching-learning Hours- 30

Section	Topics (Course Contents)	No. of Period/ Hours
A	1. Basic operations on computer 2. Configuring Computer System 3. Control Panel Settings 4. System Tools. 5. Network Management. 6. DOS- Internal and External Commands. 7. Windows Installation. 8. Writing algorithms and flowchart 9. Search Engine, Web browsing	30 hours

**Keywords:** DOS, MS-WORD, MS-EXCEL, MS-POWER POINT

#### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. "Computer Fundamentals", P.K. Sinha, BPB Publication
2. "Fundamental of computer", V. Rajaraman, PHI Publication

#### Part D: Assessment & Evaluation

- Examination of Lab course shall be conducted in combination with BCASCC-4P at the end of Sem.- I
- Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.
- Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.

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Part A: Introduction			
Program: Certificate Course	Class: BCA 1 <sup>st</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCASCC -2T	(CASC - 2T)	
2 Course Title	Programming in C		
3 Course Type	Core Course		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Learn the fundamental programming concepts and methodologies which are essential to create good C programs.</li> <li>Practice the fundamental programming methodologies in the C programming language via laboratory experiences.</li> <li>Code, test, and implement a well-structured, robust computer program using the C programming language.</li> <li>Write reusable modules (collections of functions).</li> </ul>		
6 Credit Values	03		
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### Part B: Content of the Course

Total No. of Teaching-learning - Hours- 45 / Periods-60

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>C Programming Concepts</b> History of C language, C Language Character set. Tokens, Constant, Keywords and Identifiers, Variables Data Types Declaration and Assignment of Variables, Operators and Expressions: Types of Operators, Precedence and Associativity. <b>Control Statements:</b> if, if-else, Looping: while, do-while, for loop, Switch, break and continue, goto statements.	12 hours
II	<b>Arrays, String, Structures and Unions in C</b> <b>Arrays:</b> Definition, Single, Two Dimensional and Multi-dimensional arrays. <b>Strings:</b> Handling of Character Set: Declaration & Initialization of String Variables, String handling functions, <b>Structures and Unions:</b> Definitions, Initialization and Assigning Values to Members, Arrays of Structures and Arrays Within Structures, Union.	11 hours
III	<b>Functions and Pointers</b> User Defined Functions, Functions Definition , Prototypes ,Passing arguments, Calling a Function - Nesting of Functions, Recursion, Pointers: Declaration and Initialization of Pointers, Pointer Expression, Operation on Pointers arithmetic. Arrays of Pointers, Pointer on Pointers. Storage Classes - Automatic, External, Static, Register.	11 hours
IV	<b>File Maintenance in C</b> File Input/Output: Opening and closing a file, file opening modes, Study of file I/O Operations: fopen (), fclose( ), fputs ( ), fgets ( ), fread ( ), fwriteQ, Input / Output Operations on a file, Random access to file.	11 hours
Keywords:	Token, Data Type, Loop, Conditional statements, Function, Array, Pointer	


  
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### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

#### Text Books Recommended-

1. LET US C, Yashwant Kanetkar, BPB PUBLICATIONS
2. The Complete Reference C, Herbert Schildt, Tata McGraw HILL
3. PROGRAMMING IN ANSI C - by E. Balgurusamy - Tata McGraw HILL
4. PROGRAMMINGWITH C. Byron Govtfred, Tata McGraw HILL

#### Reference Books:

1. The "C" Programming Language, Brian W. Kernighan & Dennis Ritchie, Pearson
2. The Spirit of "C" - Henry Matisse, Herbert L. Cooper.
3. Mastering "C" - Crain Bolon.

#### Online Resources:

1. <https://www.ndl.gov.in/> (National Digital Library of India)
2. <https://www.swayam.gov.in> ( SWAYAM PORTAL)
3. <https://www.doabooks.org/> ( Directory of Open Access Books)
4. <https://nptel.ac.in/> National Programme on Technology Enhanced Learning (NPTEL)
5. <https://epgp.inflibnet.ac.in/> E-PG Pathshala
6. <http://cec.nic.in/cec/> (e-Content Courseware in UG Subjects)
7. <https://egyankosh.ac.in/> ( E-Gyankosh)

### PART - D: Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE) 20 Marks

Semester End Exam (SEE): 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks	
	Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

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Part A: Introduction				
Program: Certificate Course	Class: BCA 2 <sup>nd</sup> Semester BCASCC -2P	Year: 2022 (CASC-2P)		Session: 2022-23
1 Course Code				
2 Course Title	Programming Lab in C			
3 Course Type	Laboratory Course			
4 Pre-requisite(if any)	As per Govt. Norms			
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Learn the fundamental programming concepts and methodologies which are essential to create good C programs.</li> <li>Practice the fundamental programming methodologies in the C programming language via laboratory experiences.</li> <li>Code, test, and implement a well-structured, robust computer program using the C programming language.</li> <li>Write reusable modules (collections of functions).</li> </ul>			
6 Credit Values	01			
7 Total Marks	Max. Marks: 50	Min Passing Marks: 20		

### Part B: Content of the Course

Total No. of Teaching-learning Hours- 30

Section	Topics (Course Contents)	No. of Hours
A	<ol style="list-style-type: none"> <li>If a five digit number is input through the keyboard, write a program to reverse the number, print the sum and product of digit.</li> <li>WAP to interchange the content of two variable (swapping).</li> <li>WAP to convert and print the distance in meter, feet, inches and centimeter if distance is input through the keyboard.</li> <li>WAP a to check whether a year entered through keyboard is a leap year or not.</li> <li>WAP to check whether a number is even or odd.</li> <li>WAP to determine whether entered character is a capital or small or digit or special symbol.</li> <li>WAP to find the factorial value of any number entered through keyboard.</li> <li>WAP to compute the sum of the first n terms of the following series  <math>S = 1+1/2+1/3+1/4+\dots</math> </li> <li>WAP to compute the sum of the first n terms of the following series  <math>S = 1-2+3-4+5\dots</math> </li> <li>WAP to print all prime numbers from 1 to 100.</li> <li>WAP to print a triangle of stars as follows (take number of lines from user):           <pre> * ** ***** ****** *****</pre> </li> <li>Write a menu driven program using switch which has</li> </ol>	30 hours

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	<p>following option:</p> <ul style="list-style-type: none"> <li>I) Factorial of number</li> <li>II) Prime or Not</li> <li>III) Odd or Even</li> </ul> <p>13) Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by user is Palindrome or not.</p> <p>14) Write a function to implement question number one (1) to seven (7) in above list.</p> <p>15) WAP to perform following operations on strings:</p> <ul style="list-style-type: none"> <li>a) Concatenate two strings.</li> <li>b) Compare two strings</li> <li>c) Calculate length of the string</li> <li>d) Convert all lowercase characters to uppercase</li> <li>e) Convert all uppercase characters to lowercase</li> <li>f) Calculate number of vowels</li> <li>g) Reverse the string</li> </ul> <p>16) Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Initialize the structure and print the initialized value on screen.</p> <p>17) WAP to explain pointer arithmetic.</p> <p>18) WAP to explain the concept of call by value and call by address mechanism.</p> <p>19) WAP to read Content of file and print them on screen.</p> <p>20) WAP to copy content of one file into another.</p> <p>21) WAP to explain following function-  <b><code>fopen()</code>, <code>fclose()</code>, <code>fputs()</code>, <code>fgets()</code>, <code>fread()</code>, <code>fwrite()</code></b></p>	
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**Keywords:** Conditional statements, looping, Array.

#### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

##### Text Books Recommended-

1. LET US C, Yashwant Kanetkar, BPB PUBLICATIONS
2. The Complete Reference C, Herbert Schildt, Tata McGraw HILL
3. PROGRAMMING IN ANSI C - by E. Balgurusamy - Tata McGraw HILL

#### Part D: Assessment & Evaluation

- Examination of Lab course shall be conducted in combination with BCASCC-5P at the end of Sem.-**I**
- Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.
- Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.

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Part A: Introduction			
Program: Certificate Course	Class: BCA 1 <sup>st</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCASCC -3T	(CASC-3T)	
2 Course Title	<b>Digital Electronics and Microprocessor</b>		
3 Course Type	<b>Core Course</b>		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Understand the fundamental concepts and techniques used in digital electronics.</li> <li>Understand and examine the structure of various number systems and its application in digital design.</li> <li>Understand, analyse and design various combinational and sequential circuits.</li> <li>Classify different semiconductor memories.</li> </ul>		
6 Credit Values	04 ( 3 Theory + 1 Tutorial)		
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### Part B: Content of the Course

Total No. of Teaching-learning - Hours- 60 / Periods-80

Unit	Topics (Course Contents)	No. of Period/Hours
I	<b>Background of Digital Electronics</b> Digital Signals, Different Type of Numbering System: Decimal, Octal, Binary, Hexadecimal, Conversation from One Number System to Another System, Binary Addition, Binary Subtraction, Binary Complements. One's & Two's Complement, Binary Subtraction Using Two's Complement. Logic Gate Basics: OR Gate, AND Gate, NOT Gate, Exclusive-OR (XOR) Gate, Truth Tables for Logic Gates, Truth Tables for Combinational Logic.	15 hours
II	<b>Logic families and Boolean Algebra</b> Types of Logic Family: RTL, DTL, TTL ,Emitter Coupled Logic (ECL) and CMOS Logic Family, Comparison of Different Logic Families Boolean algebra, Minimization of Switching Functions: Standard representation of logic function (SOP and POS), Minimization technique- K Map method, don't care combinations.	15 hours
III	<b>Combinational and Sequential Circuit</b> <b>Combinational Circuits:</b> Adder, Subtractor, Encoder, Decoder, Multiplexer (MUX), De-Multiplexer. <b>Sequential circuits:</b> Definition, Basic flip-flops- SR, JK, T and D, Master Slave Flip Flop, race around condition, Steps in synchronous sequential circuit design: Register, modulo-N counter, Ring counter & Shift counters.	15 hours
IV	<b>Microprocessor</b> Generic Architecture of Microprocessor, Pin Diagram & Pin Function of Intel 8085 Microprocessor, Instructions Set for Microprocessor, Definition and need of Addressing Mode,	15 hours


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	Addressing Modes of Intel 8085 & 8086 Microprocessor, Machine Cycle and Instruction Cycle of Microprocessor, Working of Microprocessor.	
<b>Keywords:</b>	Logic gate, Sequential circuit, Combinational Circuit, Microprocessor	

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

#### TEXTBOOKS:

1. "Computer Fundamentals Architecture and Organization", Bram, New Age Techno Press.
2. "Digital Design", Morris Mano, PHI, 3rd Edition, 2006.
3. Malvino A.P, Digital Principles and Applications, Tata McGraw Hill.

#### REFERENCE BOOKS:

1. An Engineering Approach To Digital Design – Fletcher, PHI.
2. Digital Logic – Application and Design – John M. Yarbrough, Thomson 3.
3. Fundamentals of Logic Design – Charles H. Roth, Thomson Publications, 5th Edition, 2004.
4. Digital Logic Applications and Design – John M. Yarbrough, Thomson Publications, 2006.

#### ONLINE RESOURCES:

1. <https://www.ndl.gov.in/> (National Digital Library of India)
2. <https://www.swayam.gov.in> ( SWAYAM PORTAL)
3. <https://www.doabooks.org/> ( Directory of Open Access Books)
4. <https://nptel.ac.in/> National Programme on Technology Enhanced Learning (NPTEL)
5. <https://epgp.inflibnet.ac.in/> E-PG Pathshala
6. <http://cec.nic.in/cec/> (e-Content Courseware in UG Subjects)
7. <https://egyankosh.ac.in/> ( E-Gyankosh)

### PART - D: Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE) 20 Marks

Semester End Exam (SEE): 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End Exam (SEE):</b>	<b>Paper – Two section – A &amp; B</b> Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

<b>Part A: Introduction</b>				
Program: Certificate Course	Class: BCA 2 <sup>nd</sup> Semester	Year: 2023	Session: 2023-24	
Course Code	BCASCC -4T	(CASC-4T)		
1 Course Title	PC Software Package			
2 Course Type	Core Course			
3 Pre-requisite(if any)	As per Govt. Norms			
4				
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Identify the parts of the Windows operating system and uses of common Windows OS elements.</li> <li>Learn Modern office activities and their software requirements.</li> <li>Create a new Word document and formatting a document using MS-WORD.</li> <li>Create an electronic spreadsheet using MS-Excel, familiarize oneself with Excel's basic and advance features.</li> <li>Learn slide show presentation concepts and explore the Microsoft Office PowerPoint environment.</li> </ul>			
6 Credit Values	03			
7 Total Marks	Max. Marks: 100	Min Passing Marks: 33		

#### **Part B: Content of the Course**

Total No. of Teaching-learning - Hours- 45 / Periods-60

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>WINDOWS</b> Basic Elements of WINDOWS, Features of Windows. Windows Explorer (Files and Folder Operations), Accessories like Accessibility, Entertainment, Communication, System Tools, Paint Brush, Calculator, Calendar, Clock, Note Pad, Word Pad Etc., Control Panel, Display Settings, Adjusting Sound, Changing the Date and Time, Changing Language and Region Options, Customizing Folder View Options, Connecting to the Internet: Dial-Up Connections, Installing New Hardware & Printer, Installing & Removing Software, Power Settings.	12 hours
II	<b>Introduction to MS Word</b> Word Processor, MS- Word, Chief Elements of MS-Word. Menus and toolbars, Shortcuts, Opening Files, Saving Files, Formatting page and Setting Margins, Converting files to different formats, Editing text documents- Inserting, Deleting, Cut, Copy, paste, Undo, Redo, Find, Search, Replace, Using Tool bars, Ruler-Using Icons, Using help; Formatting Documents: Setting Font Styles, Setting Paragraph style, Setting Page Style, Setting Document Styles, Creating Tables, Drawing, Tools, Printing Documents, Mail Merge.	11 hours
III	<b>Introduction to MS Power Point</b> Creating new Presentation, Power point window and its elements. Different presentation templates, Setting backgrounds, Selecting presentation layouts, Formatting a presentation-Adding style, Color, Arranging objects, Adding Header & Footer, Slide Background, Slide layout, Text Formatting in slides. Inserting	11 hours

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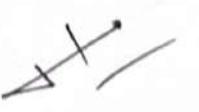
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	pictures, movies, tables etc. into the presentation, Drawing Pictures using Draw, Setting Animation & transition effect, Adding audio and video, Printing Handouts.			
IV	<b>Introduction to MS Excel</b> Introduction: Spreadsheet & its elements. Applications, Menus & Toolbars, Shortcuts, Working with Spreadsheets-Opening, Saving Files, Setting Margins, Converting files to different formats, Formatting Spreadsheets- Cell, row, column & Sheet, Alignment, Font, Border & shading. Highlighting values, Hiding/Locking Cells: Worksheet formatting - Sheet Name, Row & Column Headers, Row Height, Column Width and Worksheet Sheet Formatting , Graphs, Printing worksheet. Functions and operators.	11 hours		
<b>Keywords:</b>	Microsoft Word, Excel, Powerpoint, Windows			
<b>Part C: Learning Resource</b>				
Text Books, Reference Books, Other Resources				
Suggested Readings:				
<b>Text Books Recommended-</b>				
<ol style="list-style-type: none"> <li>1. Comdex Computer Course Kit (windows 7 with office 2010), Gupta Vikas. Dreamtech Publication</li> <li>2. Mastering MS Office 2000, Professional Edition by Courier, BPB Publication</li> <li>3. MS Office 2000 Training Guide by Maria, BPB Publications</li> <li>4. MS Office complete by SYBEX.</li> </ol>				
<b>ONLINE RESOURCES:</b>				
<ol style="list-style-type: none"> <li>1. <a href="https://www.ndl.gov.in/">https://www.ndl.gov.in/</a> (National Digital Library of India)</li> <li>2. <a href="https://www.swayam.gov.in">https://www.swayam.gov.in</a> ( SWAYAM PORTAL)</li> <li>3. <a href="https://www.doabooks.org/">https://www.doabooks.org/</a> ( Directory of Open Access Books)</li> <li>4. <a href="https://nptel.ac.in/">https://nptel.ac.in/</a> National Programme on Technology Enhanced Learning (NPTEL)</li> <li>5. <a href="https://epgp.inflibnet.ac.in/">https://epgp.inflibnet.ac.in/</a> E-PG Pathshala</li> <li>6. <a href="http://cec.nic.in/cec/">http://cec.nic.in/cec/</a> (e-Content Courseware in UG Subjects)</li> <li>7. <a href="https://egyankosh.ac.in/">https://egyankosh.ac.in/</a> ( E-Gyankosh)</li> </ol>				

<b>PART - D: Assessment and Evaluation</b>		
Suggested Continuous Evaluation Methods:		
<b>Maximum Marks:</b>	100 Marks	
<b>Continuous Comprehensive Evaluation (CCE)</b>	20 Marks	
<b>Semester End Exam (SEE):</b>	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	


Part A: Introduction			
Program: Certificate Course	Course Code	Class: BCA 2 <sup>nd</sup> Semester	Year: 2023 Session: 2023-24
1	Course Title	BCASCC -4P	PC Software Lab
2	Course Type	Laboratory Course	
3	Pre-requisite(if any)	As per Govt. Norms	
4	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Learn Modern office activities and their software requirements.</li> <li>• Create a new Word document and formatting a document using MS-WORD.</li> <li>• Create an electronic spreadsheet using MS-Excel, familiarize oneself with Excel's basic and advance features.</li> <li>• Create slide show presentation and explore the Microsoft Office PowerPoint environment.</li> </ul>	
5	Credit Values	01	
6	Total Marks	Max. Marks: 50	Min Passing Marks: 20 <i>5</i>

#### Part B: Content of the Course

Total No. of Teaching-learning Hours-30

Section	Topics (Course Contents)	No. of Hours
B	<b>MS WORD:</b> Basic formatting, Paragraph formatting, Page formatting. Home, Insert, Draw, Design, Layout, Mailing tab. Print Options. <b>MS POWER POINT:</b> Creating Presentations, Addition and formatting slides. Effects and Animation. Slide Show, Recording <b>MS EXCEL:</b> Operators in MS EXCEL, basic operations on cell, Using functions, Graph and Charts.	30 hours

Keywords: DOS, MS-WORD, MS-EXCEL, MS-POWER POINT

#### Part C: Learning Resource

Text Books, Reference Books, Other Resources

##### Text Books Recommended-

1. Comdex Computer Course Kit (windows 7 with office 2010), Gupta Vikas. Dreamtech Publication
2. Mastering MS Office 2000, Professional Edition by Courier, BPB Publication
3. MS Office 2000 Training Guide by Maria, BPB Publications

#### Part D: Assessment & Evaluation

- Examination of Lab course shall be conducted in combination with BCASCC-1P at the end of Sem.-II
- Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.
- Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.

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Part A: Introduction				
Program: Certificate Course	Class: BCA 2 <sup>nd</sup> Semester	Year: 2023	Session: 2023-24	
1 Course Code	BCASCC -5T	(CASE-5T)		
2 Course Title	Programming in C++			
3 Course Type	Core Course			
4 Pre-requisite(if any)	As per Govt. Norms			
5 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Learn the fundamental programming concepts and methodologies which are essential to create good C++ programs.</li> <li>Practice the fundamental programming methodologies in the C++ programming language via laboratory experiences.</li> <li>Code, test, and implement a well-structured, robust computer program using the C++ programming language.</li> <li>Write reusable modules (collections of functions).</li> </ul>			
6 Credit Values	03			
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40		

### Part B: Content of the Course

Total No. of Teaching-learning - Hours- 45 / Periods-60

Unit	Topics (Course Contents)	No. of Period/Hours
I	Features of C++, OOP vs. procedure-oriented programming, OOP Concepts: Abstraction, Inheritance, Polymorphism, Data Binding, Encapsulation, Classes, subclasses and Objects; Basics of C++: Data Types and sizes, Variable, Constants and its types, Use of « and » operators, Operators and Expressions Precedence and Order of Evaluation. Program Flow & Decision Control: if, if - else, if - else if, Loop Control: while, do - while, for, break, continue, Case Control: switch, goto	12 hours
II	Binding Data & Functions: Defining a Class, Creating an Object, Scope, Data Abstraction, Data Encapsulation, Inline function, Passing Default arguments in function. Constructors and Destructors: Parameterized & Copy constructor, Member Functions & Methods, Friend Class and Friendly Functions, Returning Objects, Arrays of Objects.	11 hours
III	Polymorphism: Compile time and run time, function and Operator overloading. Rules for Overloading, Operator overloading and its uses: Overloading unary and binary operators, Virtual functions, Rules for Virtual Functions, Pure Virtual Functions, Converting data types: Basic to class type, Class to Basic Type, Class to Another Class Type.	11 hours
IV	Reusing Classes: Inheritance-Base and Derived classes, Inheritance types, Access Modifiers, Multiple & Multilevel Inheritance, Calling Base Class Constructor, Overriding Base Class Members, Exception Handling, Throwing an exception, Catch.	11 hours
Keywords:	Object Oriented Programming, Class, Inheritance, Polymorphism, Object	

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### Part C: Learning Resource

Text Books, Reference Books, Other Resources

#### Suggested Readings:

##### Text books:

1. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
2. Object Oriented Programming in C++, 4th Edition, R.Lafore, SAMS, Pearson Education

##### Reference Books:

1. An Introduction to OOP, 3rd Edition, T. Budd, Pearson Education, 2008.
2. Programming Principles and Practice Using C++, B.Stroutstrup, Addison- Wesley, Pearson Education.
3. Problem solving with C++, 6th Edition, Walter Savitch, Pearson Education, 2007.
4. The Art, Philosophy and Science of OOP with C++, R.Miller,SPD. OP in C++, J3rd Edition, T.Gaddis, J.Walters and G.Muganda, Wiley DreamTech Press.
5. An Introduction to OOP in C++ with applications in Computer Graphics, 2nd Edition, G.M.Seed, Springer. Programming with ANSI C++, B.Trivedi, Oxford Press.

#### ONLINE RESOURCES:

1. <https://www.ndl.gov.in/> (National Digital Library of India)
2. <https://www.swayam.gov.in> ( SWAYAM PORTAL)
3. <https://www.doabooks.org/> ( Directory of Open Access Books)
4. <https://nptel.ac.in/> National Programme on Technology Enhanced Learning (NPTEL)
5. <https://epgp.inflibnet.ac.in/> E-PG Pathshala
6. <http://cec.nic.in/cec/> (e-Content Courseware in UG Subjects)
7. <https://egyankosh.ac.in/> ( E-Gyankosh)

### PART - D: Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Comprehensive Evaluation (CCE) 20 Marks

Semester End Exam (SEE): 80 Marks

Internal Assessment:	Class Test – 02 of 10 Marks Each	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	Assignment – 01 of 10 Marks	
Comprehensive		
Evaluation (CCE)		
Semester End Exam (SEE):	Paper – Two section – A & B Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

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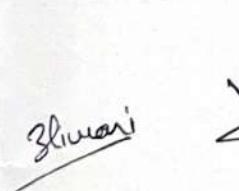
Program: Certificate Course		Part A: Introduction		
1	Course Code	Class: BCA 2 <sup>nd</sup> Semester BCASCC -5P	Year: 2022	Session: 2022-23
2	Course Title	Programming Lab in C++		
3	Course Type	Laboratory Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Learn the fundamental programming concepts and methodologies which are essential to create good C++ programs.</li> <li>Practice the fundamental programming methodologies in the C++ programming language via laboratory experiences.</li> <li>Code, test, and implement a well-structured, robust computer program using the C++ programming language.</li> <li>Write reusable modules (collections of functions).</li> </ul>		
6	Credit Values	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

### Part B: Content of the Course

Total No. of Teaching-learning Hours- 30

Section	Topics (Course Contents)	No. of Hours
A	<ol style="list-style-type: none"> <li>Write a C++ program to find the sum of individual digits of a positive integer.</li> <li>A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.</li> <li>Write a C++ program to generate the first n terms of the sequence.</li> <li>Write a C++ program to generate all the prime numbers between 1 and n , where n is a value supplied by the user.</li> <li>Write C++ programs that use both recursive and non-recursive functions             <ol style="list-style-type: none"> <li>To find the factorial of a given integer,</li> <li>To find the GCD of two given integers,</li> <li>To find the n<sup>th</sup> Fibonacci number.</li> </ol> </li> <li>Write a C++ program that uses a recursive function for solving Towers of Hanoi problem.</li> <li>Write a C++ program to find both the largest and smallest number in a list of integers.</li> <li>Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are:             <ol style="list-style-type: none"> <li>Reading a matrix,</li> <li>Printing a matrix,</li> <li>Addition of matrices</li> <li>Subtraction of matrices.</li> <li>Multiplication of matrices.</li> </ol> </li> <li>Write a C++ Program to Explain concept of CLASS &amp;</li> </ol>	30 hours

OBJECT.	10) Write a C++ program to explain function overloading. 11) Write a C++ program to overload + operator. 12) Write a C++ program to explain Constructor, parameterized Constructor, Copy Constructor. 13) Write a C++ program to explain Destructor. 14) Write a C++ program to explain Inheritance. 15) Write a C++ program to implement polymorphism.	
Keywords:	Class, object, Inheritance	
	<b>Part C: Learning Resource</b> Text Books, Reference Books, Other Resources	
Suggested Readings:		
<i>Text Books Recommended-</i>		
	1. An Introduction to OOP, 3rd Edition, T. Budd, Pearson Education, 2008. 2. Programming Principles and Practice Using C++, B. Stroutstrup, Addison- Wesley, Pearson Education. 3. Problem solving with C++, 6th Edition, Walter Savitch, Pearson Education, 2007. 4. Database Systems Concepts, A Silberschatz, H F. Korth & S. Sudarshan, McGraw-Hill.	
	<b>Part D: Assessment &amp; Evaluation</b>	
	<ul style="list-style-type: none"> <li>Examination of Lab course shall be conducted in combination with BCASCC-2P at the end of Sem.-II</li> <li>Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.</li> <li>Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.</li> </ul>	

<b>Part A: Introduction</b>			
Program: Certificate Course	Class: BCA 2 <sup>nd</sup> Semester	Year: 2023	Session: 2023-24
Course Code	BCASCC -6T		
1 Course Title	Discrete Mathematics		
2 Course Type	Core Course		
3 Pre-requisite(if any)	As per Govt. Norms		
4 Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving</li> <li>Be able to use effectively algebraic techniques to analyze basic discrete structures and algorithms.</li> <li>Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples</li> </ul>		
5 Credit Values	04 (3Th + 1T)		
6 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### **Part B: Content of the Course**

Total No. of Teaching-learning - Hours- 60 / Periods-80

Unit	Topics (Course Contents)	No. of Period/ Hours
I	Recall of statements and logical connectives, tautologies and contradictions, logical equivalence, algebra of propositions, quantifiers, existential quantifiers and universal quantifiers. Boolean algebra and its properties, algebra of propositions as an example, De Morgan's Laws	15 hours
II	Partial order relations G.L.B., L.U.B. Algebra of electric circuits and its applications. Boolean functions - disjunctive and conjunctive normal forms. Boolean's expansion theorem, fundamental forms. Many terminal Networks	15 hours
III	Set, Subsets, Operations on Sets, Arbitrary Cartesian product of sets. Partition of sets, Relations, Equivalence relations, functions, injective, surjective, bijective maps, binary operations.	15 hours
IV	Basic Concept of Graph Theory, Sub graphs, finite and infinite graphs, Isomorphic graphs, Parallel edges and self-loops in a graph, Walk, path and circuit in a graph, Trees and their properties, Binary Trees, Spanning Trees, Directed Trees, Planar graphs, Euler Circuit, Hamiltonian Graph.	15 hours

**Keywords:** Graph, Tree, Set, Boolean algebra

### **Part C: Learning Resource**

Text Books, Reference Books, Other Resources

Suggested Readings:

#### **Text Books Recommended-**

1. "Discrete Mathematical structures with Applications to Computer Science", JP Tremblay and R. Manohar, TMH International Edition (Latest Edition)
2. "Graph theory and its application to Engineering and Computer Science", NarsingDeo, PHI (Latest

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Edition)  
3. "Advanced Discrete Mathematics" H.K. Pathak, J.P. Chauhan, Shiksha Sahitya Prakashan

### REFERENCE BOOK

1. "Discrete Mathematics", Seymour Lipschutz & Marc Lipson, TMH
2. "Discrete Mathematics and Its Applications", Kenneth H. Rosen, TMH
3. "Discrete Mathematics with Graph Theory" Goodaire and Parmenter, EEE.

### ONLINE RESOURCES:

1. <https://www.ndl.gov.in/> (National Digital Library of India)
2. <https://www.swayam.gov.in> ( SWAYAM PORTAL)
3. <https://www.doabooks.org/> ( Directory of Open Access Books)
4. <https://nptel.ac.in/> National Programme on Technology Enhanced Learning (NPTEL)
5. <https://epgp.inflibnet.ac.in/> E-PG Pathshala
6. <http://cec.nic.in/cec/> (e-Content Courseware in UG Subjects)
7. <https://egyankosh.ac.in/> ( E-Gyankosh)

### PART - D: Assessment and Evaluation

#### Suggested Continuous Evaluation Methods:

Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE)	20 Marks
Semester End Exam (SEE):	80 Marks

Internal Assessment:	Class Test – 02 of 10 Marks Each	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment	
Continuous Comprehensive Evaluation (CCE)	Assignment – 01 of 10 Marks		
Semester End Exam (SEE):	Paper – Two section – A & B		
	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks		
	Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks		

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<b>Part A: Introduction</b>				
Program: Certificate Course	Course Code	Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24
1	Course Title	Relational Database Management System		
2	Course Type	Core Course		
3	Pre-requisite(if any)	As per Govt. Norms		
4	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Understand Data, Database system and its architecture.</li> <li>• Apply ER modeling and Relational Database design using Normalization.</li> <li>• Apply concepts of database storage and querying. Understand Concurrency, Recovery and Security mechanism in DBMS.</li> <li>• Understand Current advances in DBMS.</li> </ul>		
5	Credit Values	03		
6	Total Marks	Max. Marks: 100	Min Passing Marks: 40	
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### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>Introduction to DBMS</b> Data & Information, File systems versus Database systems, Schemas and Instances, Data Abstraction, Data Independence, Database languages and Interfaces, DBMS Architecture, Data Independence, Data modeling using Entity - Relationship (ER) Model: Entity sets, attributes and keys, Relationship types, sets, roles and structural constraints, Weak Entity types. Data Models: Relational, Network, Hierarchical. Relational data model concepts.	10 hours/15 periods
II	<b>RDBMS and Design Concepts</b> Codd's 12 rules, Relational Algebra and Relational calculus, SQL Programming Techniques: DDL, DML, DCL query statements, Constraints and Triggers, Views and Indexes. <b>Database Design Concepts</b> Data dependency, Armstrong's Axioms, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF), Relational Database design Algorithms and further dependencies, De-normalization.	10 hours/15 periods
III	<b>Transaction Processing</b> ACID Properties of Transactions, Concurrency control, Transaction support in SQL, Locking Techniques. Database recovery techniques - Shadow paging, Log Based Recovery, ARIES recovery algorithm, Database Security, Deadlock: Detection, Avoidance and Recovery.	10 hours/15 periods
IV	<b>Introduction to Current Trends</b> – Centralized and Client Server Architectures, Distributed Databases, Object Oriented Database, Spatial & Temporal Databases, Data Mining & Warehousing, Data Visualization, Mobile Databases, OODB & XML Databases, Multimedia & Web Databases.	10 hours/15 periods
Keywords:	ER Model, SQL Programming Techniques, Database Security	

### Part C: Learning Resource

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**Text Books, Reference Books, Other Resources**

**Suggested Readings:**

**Text Books:**

1. Fundamentals of Database Systems, R Elmasri & S B. Navathe, Pearson Education.
2. Database Systems Concepts, A Silberschatz, H F. Korth & S. Sudarshan, McGraw-Hill.
3. Fundamentals of Database Management Systems, Mark L. Gillenson, Wiley India Pvt.
4. Introduction To Database Systems, C.J.Date, Longman, Pearson Education

**Reference Books:**

1. Database Systems: A Complete Book, Molina, Ullman, J. Widom, Pearson Education.
2. Database Systems: Design, Implementation, and Management, Peter Rob & Carlos Coronel, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Database Systems Using Oracle, Nilesh Shah, PHI Learning Pvt. Ltd., New Delhi.
4. Database Management Systems, R Ramakrishnan, J Gehrke, McGraw-Hill Education
5. database Development and Management, Lee Chao, Auerbach Publications.

**PART - D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

**Maximum Marks:** 100 Marks

**Continuous Comprehensive Evaluation (CCE)** 20 Marks

**Semester End Exam (SEE):** 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment	
Continuous	<b>Assignment – 01 of 10 Marks</b>		
Comprehensive			
Evaluation (CCE)			
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>		
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – <b>10 + 10 = 20 Marks</b>		
	Section B: Descriptive answer type questions unit wise – <b>15 x 04 = 60 Marks</b>		

Part A: Introduction			
Program: Certificate Course	Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCA7P		
2 Course Title	Lab based SQL		
3 Course Type	Laboratory Course		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)		1. Formulate queries in Structured Query Language (SQL) for database manipulation. 2. Student would be able to create a table, execute queries and SQL programs. 3. Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations. 4. Design and implement a database schema for a given problem. 5. Do connectivity of PHP and MySQL to develop applications.	
6 Credit Values	01		
7 Total Marks	Max. Marks: 50	Min Passing Marks: 20	

#### Part B: Content of the Course

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/Hours
A	1. Creation of databases and execution of SQL queries. 2. Creation of Tables using MySQL: Data types, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables. 3. Practicing DML commands- Insert, Select, Update, Delete. 4. Practicing Queries using ANY, ALL, IN, EXISTS, NOT, EXISTS, UNION, INTERSECT, and CONSTRAINTS, etc. 5. Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping. 6. Use of COMMIT, ROLLBACK and SAVEPOINT. 7. Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger. 8. To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form.	60 hours

**Keywords:** Use basic SQL Commands, Triggers

#### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books Recommended-**

1. Paul DuBois, "MySQL Cookbook: Solutions for Database Developers and Administrators," Third Edition, O'Reilly Media, 2014.

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2. Frank M. Kromann, "Beginning PHP and MySQL: From Novice to Professional," Fifth Edition, Apress, 2018.
  3. Joel Murach and Ray Harris, "Murach's PHP and MySQL," First Edition, Mike Murach & Associates, 2010.
  4. Luke Welling, Laura Thomson, "PHP and MySQL Web Development," Fourth Edition, Addison-Wesley, 2008.

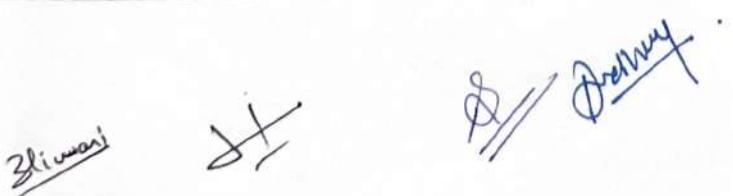
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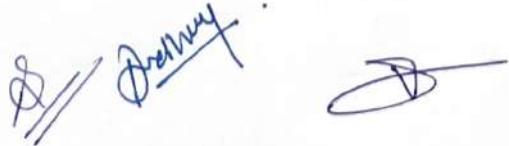
Part A: Introduction				
Program: Certificate Course		Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24
1	Course Code	BCA8T		
2	Course Title	Data Structure		
3	Course Type	Core Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. Select appropriate data structures as applied to specified problem definition. 2. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures. 3. Describe stack, queue and linked list operations. 4. Implement appropriate sorting/searching technique for any given problem.		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

#### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/Hours
I	<b>Introduction and Array</b> Data Types, Data Structure and its Classification, Arrays: Array concept (one dimension, two dimension), Operations for one dimension array (insertion, deletion, traversal) <b>Linked List:</b> Concept of a linked list, Circular & Doubly linked list, Operations on linked lists, List Manipulation with Pointers, Insertion & Deletion of elements, Applications of linked lists.	10 hours/15 periods
II	<b>Stacks and Queues</b> <b>Stack:</b> Definition, Operations PUSH, POP, Implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack. <b>QUEUES:</b> Introduction, Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE), implementation using array and linked list, Applications	10 hours/15 periods
III	<b>Trees and Graphs</b> <b>Tree:</b> Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, AVL Trees, B tree, B+ tree. <b>Graphs:</b> Introduction, Graph Theory Terminology, representation of graphs, Operations on graph, Graph Traversal – Breadth first Traversal, Depth first Traversal, Shortest path Algorithm.	10 hours/15 periods
IV	<b>Searching and Sorting</b> Linear and Binary Search Algorithms, Complexity, Binary Search Trees (construction, insertion, deletion & search), Sorting	10 hours/15 periods

  
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	Algorithms: Bubble Sort, Insertion Sort, Selection Sort, Tree sort, Heap Sort, Quick Sort, Merge Sort & Radix sort, External Sorting
<b>Keywords:</b>	Array, Linked List, Trees, Graph

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Book:**

1. Data Structures using C, A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
2. Data Structures using C by A. K. Sharma, Pearson Education
3. Data Structures and Algorithms, A.V. Aho, J.E Hopcroft and T.D. Ullman, Addison- Wesley, Low Priced Edition.
4. Fundamentals of Data structures, Ellis Horowitz & Sartaj Sahni, AW Pub.
5. Fundamentals of computer algorithms, Horowitz Sahni and Rajasekaran, Pearson Edu.
6. Data Structures and Program Design in C, Robert Kruse, PHI of Data Structures, Jr. SymourLipschetz, Schaum's outline by TMH.

### PART - D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

**Maximum Marks:** 100 Marks

**Continuous Comprehensive Evaluation (CCE)** 20 Marks

**Semester End Exam (SEE):** 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous Comprehensive Evaluation (CCE)	Assignment – 01 of 10 Marks	
<b>Semester End Exam (SEE):</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Section A: Objective and Short answer type questions – <math>10 + 10 = 20</math> Marks</b>		
<b>Section B: Descriptive answer type questions unit wise – <math>15 \times 04 = 60</math> Marks</b>		


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Part A: Introduction			
Program: Certificate Course	Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCA8P		
2 Course Title	Data Structure LAB		
3 Course Type	Laboratory Course		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)		1. Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures. 2. Student would be able to implement their program using any of the programming languages. 3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs.	
6 Credit Values	01		
7 Total Marks	Max. Marks: 50	Min Passing Marks: 20	

#### Part B: Content of the Course

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/Hours
A	1. Write a C Program to add two polynomials represented as arrays of (coefficient, exponent). 2. Write a C Program to reads two Matrixes then it will multiply or add them depending upon user's choice. 3. Write a C Program to implement stack using arrays and linked list. Write appropriate functions to perform valid operations on stack. 4. Write a program that will sort the elements using two stacks which was stored in an Array. 5. Write a program to implement two stacks in one array. You may use two top pointers for your implementation. 6. Write a program that transfers elements from stack S1 to Stack S2 so that the elements in stack S2 are in the same order as in S1 using one additional stack. 7. Write a program that will read a postfix expression from command line and resolve that using stack. 8. Convert a given infix expression to a postfix expression using stack ADT. 9. Write a program to implement a simple queue using array and linked list ADT. 10. Write a program to implement a circular queue using array and linked list ADT. 11. Write a program to implement priority scheduling scheme using queue. In priority scheduling higher priority elements selected first. The smallest no has the highest priority. 12. Write a program to implement Doubly Ended Queue using Circular Queue, where input or output restriction depends on the	60 hours

user's choice.

13. Write a program which will take elements from console and store them in a single/circular/doubly/doubly circular linked list in sorted order. The linked list must not contain any duplicate element.

14. Write a program which will search and delete an element from the single/circular/doubly/doubly circular linked list.

15. Write a program which will insert and delete an element at given position in the single/circular/doubly/doubly circular linked list.

16. Write a program to count the number of elements in a /circular/doubly/doubly circular link list.

17. Write a program that implement insert and delete at first and at last position in a single/circular/doubly/doubly circular linked list.

18. Write a program to implement insertion and deletion of node in a binary search tree.

19. Write a program to implement in-order, pre-order and post-order traversal of binary search tree using recursion.

20. Write a program to implement in-order traversal of binary search tree using stack.

21. Write a program to find the height of a binary search tree.

22. Write a program which will take elements from console to make Max/Min Heap.

23. Write a program to search given element from console in a Max/Min Heap.

24. Write a program to implement delete operation of the Max/Min Heap.

25. Write a program to sort an array while array are representing Min/Max heap.

**Keywords:** Stack, Queue, Array, Linked-List, Sorting

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books Recommended-**

1. Data Structures using C by A. K. Sharma, Pearson Education.
2. Data Structures and Program Design in C, Robert Kruse, PHI of Data Structures, Jr. Seymour Lipschetz, Schaum's outline by TMH.
3. Tanenbaum: Data structures using C (Pearson Education).
4. Kamathane: Introduction to Data structures (Pearson Education).
5. Y. Kanitkar: Data Structures Using C (BPB).
6. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007).

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<b>Part A: Introduction</b>				
Program: Certificate Course	Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24	
1	Course Code	BCA9T		
2	Course Title	Computer Organization and Architecture		
3	Course Type	Core Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. Understand the organization and architecture of computer systems, their structure and operation. 2. Illustrate the concept of machine instructions and programs. 3. Demonstrate different ways of communicating with I/O devices. 4. Describe different types memory devices and their functions. 5. Demonstrate processing unit with parallel processing and pipeline architecture.		
6	Credit Values	04		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### **Part B: Content of the Course**

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>Introduction to Computer Organization</b> Von Neumann Architecture, Harvard Architecture, Functional Units and Components in Computer Organization, Instruction Codes, Computer Registers, Computer Instructions, Instruction cycle.	10 hours/15 periods
II	<b>Central Processing Unit</b> Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC).	10 hours/15 periods
III	<b>Pipeline &amp; Vector Processing</b> Basic Concepts in Pipelining, Speed-Up, Throughput, Efficiency, Instruction pipeline, Arithmetic pipeline, Vector Processing: Vector operations, Matrix multiplication, Memory Interleaving, Array Processor: Attached array processor, SIMD Array processor.	10 hours/15 periods
IV	<b>Input-Output Organization</b> Peripheral Devices, I/O Interface, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access: DMA Controller, DMA Transfer, Memory mapped I/O. <b>Memory Organization</b> Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management Hardware.	10 hours/15 periods
<b>Keywords:</b>	Addressing Modes, Pipeline, Memory Organization	

### **Part C: Learning Resource**

Text Books, Reference Books, Other Resources

**Suggested Readings:****Text Books**

1. Flynn Computer Architecture: Pipelined and parallel processor design, JB, Boston.
2. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs. (MGH).
3. Computer System Architecture, M. Morris Mano, PHI/Pearson Education.
4. Computer Organization, C Hamacher, Z Vranesic, SafwatZaky, McGraw Hill.
5. Computer Architecture and Organization, J. P. Hayes, Tata McGraw-Hill.

**Reference Books:**

1. Parallel Computer Arch.& Algo, R.W. Hockney, C.R. Jesshope, Adam Hilger.
2. Structured Computer Organization, A. S. Tanenbaum, Pearson Education.
3. Fundamentals of Computer Organization, P. Dandamudi , Springer.

**PART - D: Assessment and Evaluation****Suggested Continuous Evaluation Methods:**

**Maximum Marks:** **100 Marks**

**Continuous Comprehensive Evaluation (CCE)** **20 Marks**

**Semester End Exam (SEE):** **80 Marks**

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment	
Continuous	<b>Assignment – 01 of 10 Marks</b>		
Comprehensive			
Evaluation (CCE)			
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>		
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – <b><math>10 + 10 = 20</math> Marks</b>		
	Section B: Descriptive answer type questions unit wise – <b><math>15 \times 04 = 60</math> Marks</b>		

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Part A: Introduction			
Program: Certificate Course	Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24
Course Code	BCA10T		
Course Title	Operating System with Linux		
Course Type	Core Course		
Pre-requisite(if any)	As per Govt. Norms		
Course Learning Outcomes (CLO)	1. Describe the important computer system resources and the role of operating system in their management policies and algorithms. 2. Understand the process management policies and scheduling of processes by CPU. 3. Evaluate the requirement for process synchronization and coordination handled by operating system. 4. Describe and analyze the memory management and its allocation policies. 5. Identify use and evaluate the storage management policies with respect to different storage Management technologies.		
Credit Values	03		
Total Marks	Max. Marks: 100	Min Passing Marks: 40	

#### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>Introduction to Operating System</b> What is an Operating System, Operating Systems Architecture, Function of Operating System., Booting Process, Types of Operating System: Multi-Programming, Multi-Tasking, Multi-Threading; Operating Systems Classification: Simple Batch Systems, Multi-programmed Batches systems, Time-Sharing Systems, Parallel & Distributed Operating Systems.	10 hours/15 periods
II	<b>Process Management and Deadlocks</b> Process States and Transitions, Cooperating Processes, Inter-process Communication, Threads, CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Process Synchronization: The Critical-Section Problem, Semaphores, Monitors, Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Recovery from Deadlock.	10 hours/15 periods
III	<b>Memory Management and Files</b> Main Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Virtual Memory: Demand Paging, Page Replacement, Page replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Files: A Simple File System, Logical & Physical File System, File-System Interface: Access Methods, Directory Structure	10 hours/15 periods
IV	<b>Linux:Introduction to Linux</b>	10 hours/15 periods

History, The Linux Architecture, Features of Linux, Internal and External Commands, Command Structure, difference between Linux and Unix, various Linux distributions, basic commands.  
Deadlock, Memory Management, Linux

**Keywords:**

**Suggested Readings:**

**Text Books:**

1. Operating System Concepts, Silberschatz and Galvin, Pearson Education Pub.
2. Operating Systems, Madnick E., Donovan J., Tata McGraw Hill,
3. Operating Systems, A. S. Tannenbaum, PHI
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
5. Linux: Complete Reference, 6th Edition, Richard Petersen, Tata McGraw-Hill.

**Reference Books:**

1. Operating Systems Internals and Design Principle, William Stallings, Prentice Hall Publishers.
2. Operating Systems- AConcept-Based Approach, Dhananjay M. Dhamdhere, McGraw-Hil.

**PART - D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

**Maximum Marks:** 100 Marks

**Continuous Comprehensive Evaluation (CCE)** 20 Marks

**Semester End Exam (SEE):** 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End Exam (SEE):</b>	<b>Paper – Two section – A &amp; B</b> Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

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Program: Certificate Course		Part A: Introduction			
1	Course Code	Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24	
2	Course Title	Lab based on OS			
3	Course Type	Laboratory Course			
4	Pre-requisite(if any)	As per Govt. Norms			
	Course Learning Outcomes (CLO)	1. To demonstrate the basic knowledge of Linux commands. 2. To create the directory, how to change and remove the directory. 3. Use of windows operating system. 4. Simulate and demonstrate the concepts of operating systems. 5. To recognize common Windows Control Panel categories.			
6	Credit Values	01			
7	Total Marks	Max. Marks: 50		Min Passing Marks: 20	

### Part B: Content of the Course

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/ Hours
A	<b>LINUX:</b> 1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd. 2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date. 3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.	30 hours
B	<b>MS-DOS:</b> DOS INTERNAL AND EXTERNAL COMMANDS. <b>CONTROL PANEL :</b> <b>Task:</b> 1. Configure an HomeGroup. 2. Require a password to be entered when the computer comes out of sleep mode. 3. Enable screen reading for any text show on the screen. 4. Determine whether a computer is on a domain or workgroup. 5. Access Device Manager. 6. Customize the Start button menu. 7. Configure whether hidden files display. 8. Configure power saving options. 9. Disable the showing of Microsoft-provided games. 10. Back up the system. 11. Configure the home page for the default Microsoft browser. 12. Set the proper time zone.	30 hours

**Keywords:** Linux, MS-DOS, CONTROL PANEL

### Part C: Learning Resource

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Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books Recommended-**

1. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.
2. Linux: Complete Reference, 6th Edition, Richard Petersen, Tata McGraw-Hill.
3. Andrew S. Tanenbaum and Herbert Bos,"Modern Operating Systems," Fourth Edition, Pearson, 2014.
4. Abraham Silberschatz, Greg Gagne, and Peter B. Galvin, "Operating System Concepts," Tenth Edition, Wiley, 2018.

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<b>Part A: Introduction</b>				
Program: Certificate Course		Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24
1	Course Code	BCA11T		
2	Course Title	Programming in Java		
3	Course Type	Core Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. Explain the object oriented concepts and apply them for solving real problems. 2. Demonstrate and apply the various features Java SDK to develop, run and debug java programs. 3. Apply java technology to develop the small applications, utilities, and web applications. 4. Apply events management and layout managers using awt, swing, jdbc and servlet for developing the software for various problems. Unit-wise Syllabus		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

#### **Part B: Content of the Course**

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	Overview of JAVA: The genesis of java, An overview of java, Java virtual machine (JVM), Java development kit (JDK), Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements. Writing simple JAVA program.	10 hours/15 periods
II	Introducing Class: Class fundamentals, Closer look at Methods and class, Nested and inner class, String handling, Constructor, this keyword, Garbage collection and finalize() method. Overloading Methods, Overloading Constructors, static, final keyword.	10 hours/15 periods
III	Inheritance: Basics, Types of inheritance, Access specifiers, using super, method overriding, Abstract class, constructor in multilevel inheritance, using final with inheritance, Dynamic method dispatch, Abstract class	10 hours/15 periods
IV	Package and Interface: Defining package, CLASSPATH, Access protection, importing package, Defining and implementing interface, Variable in interface, Extending interface, Nested interface. Exception Handling, Using try, catch, throw, throws, finally.	10 hours/15 periods
Keywords:	Inheritance, Constructor, Package	

#### **Part C: Learning Resource**

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books Recommended-**

1. Java: The complete reference By Naughton P and schildtH ,Osborne Tata Mcgraw-Hill.
2. Java Programming By E.Balguruswami

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3. Core JAVA for beginners By Rashmi Kanta Das ,Vikas Publication.  
 4. Core JAVA : A Comprehensive Study by Mahesh P. Matha , PHI publication.

**E-Resources:**

1. SWAYAM url link for Java : [https://onlinecourses.swayam2.ac.in/aic20\\_sp13/preview](https://onlinecourses.swayam2.ac.in/aic20_sp13/preview)
2. SWAYAM url link for Java : [https://onlinecourses.nptel.ac.in/noc19\\_cs84/preview](https://onlinecourses.nptel.ac.in/noc19_cs84/preview)
3. SWAYAM url link for Java : <https://www.dqindia.com/iit-bombay-offers-free-online-course-java-swayam-platform/>
4. SWAYAM url link for Java : <https://www.classcentral.com/course/swayam-programming-in-java-12930>

**PART - D: Assessment and Evaluation**

**Suggested Continuous Evaluation Methods:**

**Maximum Marks:** 100 Marks

**Continuous Comprehensive Evaluation (CCE)** 20 Marks

**Semester End Exam (SEE):** 80 Marks

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment	
Continuous	<b>Assignment – 01 of 10 Marks</b>		
Comprehensive			
Evaluation (CCE)			
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>		
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks		

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**Part A: Introduction**

Program: Certificate Course		Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24
1	Course Code	BCA11P		
2	Course Title	JAVA PROGRAMMING LAB		
3	Course Type	Laboratory Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. To prepare students to become familiar with the Standard Java technologies of J2SE . 2. To prepare students to excel in Object Oriented programming and to succeed as a Java developer through global rigorous education. 3. To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP. 4. Ability to learn and understand Java programming basics. 5. Ability to learn and understand Java looping, control statements and string manipulations.		
6	Credit Values	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

**Part B: Content of the Course**

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/ Hours
A	<ol style="list-style-type: none"> <li>1. Write a simple java application to print the message "Welcome to java".</li> <li>2. Write a program to display the month of a year. Months of the year should be held in an array.</li> <li>3. Write a java program to find the Fibonacci series using recursive and non-recursive functions.</li> <li>4. Write a program to multiply two given matrices.</li> <li>5. Write a program for Method and Constructor overloading.</li> <li>6. Write a program for sorting a given list of names in ascending order.</li> <li>7. Write a program to implement single and Multi level inheritance.</li> <li>8. Write a program to implement Hierarchical Inheritance..</li> <li>9. Write a program to implement method overriding.</li> <li>10. Write a program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the</li> </ol>	60 hours

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	<p>given shape.</p> <p>11. Write a program to implement multiple and Hybrid Inheritance.</p> <p>12. Write a program to create inner classes.</p> <p>13. Write a program to create user defined package and demonstrate various access modifiers.</p> <p>14. Write a program to demonstrate the use of super and final keywords.</p> <p>15. Write a program to demonstrate execution of static blocks, static variables &amp; static methods.</p>	
<b>Keywords:</b>	Class, Inheritance, Package	

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books Recommended-**

1. Java: The complete reference By Naughton P and schildtH. ,Osborne Tata Mcgraw-Hill.
2. Java Programming By E.Balguruswami.
3. Core JAVA for beginners By Rashmi Kanta Das ,Vikas Publication.
4. Core JAVA : A Comprehensive Study by Mahesh P. Matha , PHI publication.

**Part A: Introduction**

Program: Certificate Course	Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCA12T		
2 Course Title	Computer Network		
3 Course Type	Core Course		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)	1. Understand the basic computer network technology. 2. Understand and explain Data Communications System and its components. 3. Identify the different types of network topologies and protocols. 4. Understand the layers of the OSI model and TCP/IP.		
6 Credit Values	04		
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

**Part B: Content of the Course**

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/Hours
I	<b>Introduction to Computer Network</b> Computer Network Fundamental and types of Computer Network LAN, MAN, WAN, Transmission Media, Transmission modes, Line Configuration, Network Topologies, ISO-OSI Reference Model, TCP/IP Model	10 hours/15 periods
II	<b>Data Link Layer</b> Functions at Data Link Layer, Framing and Correction Codes: Checksum, CRC, Hamming Code, Flow Control: Stop & Wait and Sliding Window Protocols, Data Link Protocols: HDLC, Medium Access Sub-Layer, LLC Protocol, IEEE Overview of IEEE 802.2, 802.3, 802.5 802.6.	10 hours/15 periods
III	<b>Network Layer and Transport Layer</b> Functions of Network Layer, Networking & Internetworking Devices, Routing Protocols & Algorithms, Ipv4 Address, Ipv4 Addressing, Ipv6 Address, Functions of Transport Layer, Flow Control & Buffering, Introduction To TCP/UDP Protocols and their Comparison.	10 hours/15 periods
IV	<b>Application Layer and Common Network Architecture:</b> World Wide Web (WWW), Domain Name System (DNS), E-Mail, File Transfer Protocol (FTP), Hyper Text Transfer Protocol (HTTP), E-Mail Protocols: Mime & SMTP, POP, IMAP, Telnet – Remote Communication Protocol. Frame Relay, P2p, X.25, ATM, Wireless LANS – 802.11, 802.11x, Integrated Service Digital Networks (ISDN), Broad Band ISDN.	10 hours/15 periods

**Keywords:** Transmission Modes, WWW, Routing Protocols

**Part C: Learning Resource**

Text Books, Reference Books, Other Resources

Suggested Readings:

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**Text books:**

1. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.
2. Data communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
3. Internet Law-Text and Materials, chris Reed, universal law Publishing co., new delhi

**Reference book:**

1. Data and computer communication, William stallings, pearson education.
2. Computer and communication networks, nader F. Mir, Pearson Education, 2007.
3. Data &computer communication, black, PHI.

**PART - D: Assessment and Evaluation****Suggested Continuous Evaluation Methods:**

**Maximum Marks:** **100 Marks**

**Continuous Comprehensive Evaluation (CCE)** **20 Marks**

**Semester End Exam (SEE):** **80 Marks**

<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End Exam (SEE):</b>	<b>Paper – Two section – A &amp; B</b> Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

### Part A: Introduction

Program: Certificate Course	Class: BCA 3 <sup>rd</sup> Semester	Year: 2023	Session: 2023-24
1 Course Code	BCASE1		
2 Course Title	Numerical Analysis		
3 Course Type	DSE		
4 Pre-requisite(if any)	As per Govt. Norms		
5 Course Learning Outcomes (CLO)		<ol style="list-style-type: none"> <li>1. Acquire basic knowledge in solving interpolation with equal interval problems by various numerical methods. Estimate the missing terms through interpolation methods.</li> <li>2. Develop skills in analyzing the methods of interpolating a given data, properties of interpolation with unequal intervals and derive conclusions, approximate a function using an appropriate numerical method.</li> <li>3. Be able to find the derivatives using Newton's forward difference formula, Newton's backward difference formula, Derivatives using central difference formulae, Stirling's interpolation formula, Newton's divided difference formula.</li> <li>4. Be able to derive Trapezoidal rule, Simpson's 1/3 - rule, Simpson's 3/8 - rule, and Weddle's rules from.</li> <li>5. Be able to find the solution of linear systems by using Direct methods, Matrix inversion method, Gaussian elimination methods, Gauss-Jordan Method.</li> </ol>	
6 Credit Values	04		
7 Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	Errors and precision, errors due to round off, Solution of Algebraic and Transcendental Equations, Bisection Method, Method of False Position, Newton-Raphson Method.	10 hours/15 periods
II	<b>Simultaneous Equations and Matrix:</b> Gauss – Elimination method, Gauss-Jordon method ,Gauss Seidel Iterative Method, Inversion of matrix, Characteristics equation of matrix , power method , Eigen values of matrix , Transformation to diagonal forms.	10 hours/15 periods
III	<b>Interpolation:</b> Introduction, Newton's Backward Interpolation formula, Newton's Forward Interpolation formula, Lagrange's Interpolation formula, Newton divided difference formula.	10 hours/15 periods
IV	<b>Differentiation and Integration :</b> Formula for numerical differentiation and numerical integration by Trapezoidal Rule and Simpson's Rule. <b>Numerical solution of Ordinary Differential equations:</b> Taylors series method, Euler's method, Modified Euler's method, Runge-kutta method.	10 hours/15 periods
Keywords:	Interpolation, Matrix, Runge-kutta Method	

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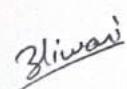
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<b>Part C: Learning Resource</b> Text Books, Reference Books, Other Resources	
Suggested Readings:	
<b>Text Books Recommended-</b>	
1. "Numerical Analysis", S.S. Sastry, PHI 2. "Numerical Method in Engineering and Science", Dr. B.S. Grewal, Khanna Publishers, 2010 3. "Computer Oriented Numerical Methods", Rajaraman, PHI 4. "Numerical Computations", Venkataraman 5. "Computer Oriented Numerical Methods", Stoer, Bullrich, Springer Verlag, 1980	

<b>PART - D: Assessment and Evaluation</b>		
Suggested Continuous Evaluation Methods:		
Maximum Marks:	100 Marks	
Continuous Comprehensive Evaluation (CCE)	20 Marks	
Semester End Exam (SEE):	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	Assignment – 01 of 10 Marks	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – <b>10 + 10 = 20 Marks</b>	
	Section B: Descriptive answer type questions unit wise – <b>15 x 04 = 60 Marks</b>	

<b>Part A: Introduction</b>					
Program: Certificate Course	Class: BCA 4 <sup>th</sup> Semester	Year: 2023	Session:2023-24		
1	Course Code	BCASE2			
2	Course Title	E-Commerce			
3	Course Type	DSE			
4	Pre-requisite(if any)	As per Govt. Norms			
5	Course Learning Outcomes (CLO)	1. Understand network infrastructure components, protocols, and security principles. 2. To provide students with an overview and understanding of e-commerce with a specific emphasis on Internet Marketing 3. Gain an introduction to different payment systems used in e-commerce and industries. 4. Understand the security considerations and challenges associated with payment systems. 5. Learn payment system integration into web applications and e-commerce platforms.			
6	Credit Values	04			
7	Total Marks	Max. Marks:100	Min Passing Marks: 40		
<b>Part B: Content of the Course</b>					
Total Lectures:					
Unit	Topics (Course Contents)			No. of Period/ Hours	
I	<b>Introduction to E-Commerce</b> Brief History of E-Commerce, Types of E-Commerce, E-Commerce business models. Advantage and Disadvantage of E-Commerce, E-Commerce Framework. Mobile- Commerce, Application, Advantage and Disadvantages.			10 hours/15 periods	
II	<b>E-Marketing and EDI</b> E-Marketing : Traditional Marketing – Identifying Web Presence Goals – Online Marketing – E-advertising – E-branding. EDI- Origin, Benefits, Mechanism, E-governance concept, E-commerce with WWW and Internet. Indian Government Initiative of E-Governance.			10 hours/15 periods	
III	<b>E-Commerce Security and Legal Issues</b> Electronic payment systems, Digital Payment Requirements, Properites of Electronic & Digital Cash, Credit Card,Internet Banking, Mobile payment and digital wallets. Digital Signature, Advantage and Risk Assessment of E-Payment. Payment through QR Codes.			10 hours/15 periods	
IV	<b>Security Protocol, Threats and Measures</b> Security Protocol, Digital certificates, Security threats in E-com environment, Credit & legal risk of e-payment system. Web security in E-Commerce, Legal and regulatory issues in E-Commerce, Consumer protection and privacy,Cybers talking – Privacy is at Risk in the Internet Age – Phishing – Application Fraud – Skimming – Copyright – Internet Gambling – Threats to Children.			10 hours/15 periods	
Keywords:	Internet Protocol, Electronic Payment system, Security Protocol				
<b>Part C: Learning Resource</b>					


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Text Books, Reference Books, Other Resources	
Suggested Readings:	
<b>Text Books:</b> <ol style="list-style-type: none"> <li>1. Computer Networks: A Systems Approach, Larry L. Peterson and Bruce S. Davie.</li> <li>2. TCP/IP Illustrated, Volume 1: The Protocols, W. Richard Stevens and Gary R. Wright.</li> <li>3. Payment Systems: From the Salt Mines to the Board Room, Lanny E. Davis and Walter J. Mix III.</li> <li>4. P.T.Joseph, S.J., "E-Commerce - An Indian Perspective", PHI 2012, 4<sup>th</sup> Edition</li> <li>5. Ravi Kalakota, Andrew B Whinston, "Frontiers of Electronic Commerce", Pearson 2006, 12<sup>th</sup> Impression</li> </ol>	
<b>Online Resources:</b> <ol style="list-style-type: none"> <li>1. <a href="https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources">https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources</a></li> <li>2. <a href="https://www.ndl.gov.in/">https://www.ndl.gov.in/</a> (National Digital Library of India)</li> <li>3. <a href="https://www.swayam.gov.in/">https://www.swayam.gov.in/</a>( SWAYAM PORTAL) <a href="https://egyankosh.ac.in/">https://egyankosh.ac.in/</a>( E-Gyankosh)</li> </ol>	

PART - D: Assessment and Evaluation		
<b>Suggested Continuous Evaluation Methods:</b>		
Maximum Marks:	100 Marks	
Continuous Comprehensive Evaluation (CCE)	20 Marks	
Semester End Exam (SEE):	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous Comprehensive Evaluation (CCE)	<b>Assignment – 01 of 10 Marks</b>	
Semester End Exam (SEE):	Paper – Two section – A & B Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	


**Part A: Introduction**

Program: Certificate Course		Class: B.Sc. I/II Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC1</b>		
2	Course Title	<b>OFFICE TOOLS</b>		
3	Course Type	<b>GENERIC ELECTIVE COURSE</b>		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Identify the parts of the Windows operating system and uses of common Windows OS elements.</li> <li>• Learn Modern office activities and their software requirements.</li> <li>• Create a new Word document and formatting a document using MS-WORD.</li> <li>• Create an electronic spreadsheet using MS-Excel, familiarize oneself with Excel's basic and advance features.</li> <li>• Learn slide show presentation concepts and explore the Microsoft Office PowerPoint environment.</li> </ul>		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

**Part B: Content of the Course**

Total No. of Teaching-learning Hours- 45

Module	Topics (Value Added Course)	No. of Hours
I	<b>Windows:</b> Introduction to Windows, Feature of Windows, Evolutions of Windows, Features of Windows, Start menu, Control panel settings, System tools, Files and Folders. Working with desktop icons, Changing the properties of desktop, Performing file and folder operations(Creating, Renaming, Opening and viewing, copying and moving, deleting)Windows Accessories( paint, calendar, calculator, notepad, WordPad).	12 Hours
II	<b>Word Processor:</b> Introduction of MS Word, Creating, Opening and Saving Word Files Applying Text Formatting, Applying Paragraph Formatting, Inserting Table and Apply Different Formatting, Inserting Pictures, Shapes, Header & footer, Chart, Smart Art and Word Art, Page formatting, Mail merge.	11 Hours
III	<b>Spread Sheets:</b> Introduction OF MS Excel, Creating, Opening and Saving Excel Sheets, inserting data in Cells, Applying Table, Applying Picture in Table and Background, Inserting And Deleting Rows & Columns, Applying various Formula and Auto Calculate in	11 Hours

	Sheets.			
IV	<b>Preparing Presentation:</b> Introduction of Power Point, Creating Opening and saving ppt, inserting new Slide, Moving and Deleting Slides, inserting image, shapes, Working with Animation And Transitions in Slides, Sound and Working With table.	11 Hours		
<b>Keywords:</b>	Windows, Word, Excel, Powerpoint.			
<b>Part C: Learning Resource</b>				
Text Books, Reference Books, Other Resources				
<b>Text Books:</b>				
<ol style="list-style-type: none"> <li>1. Comdex Computer Course Kit (windows 7 with office 2010), Gupta Vikas. Dreamtech Publication</li> <li>2. MS Office complete by SYBEX.</li> </ol>				
<b>Online Resources:</b>				
<ol style="list-style-type: none"> <li>1. <a href="https://www.ndl.gov.in/">https://www.ndl.gov.in/</a> (National Digital Library of India)</li> <li>2. <a href="https://www.swayam.gov.in">https://www.swayam.gov.in</a>( SWAYAM PORTAL)</li> <li>3. <a href="https://egyankosh.ac.in/">https://egyankosh.ac.in/</a> ( E-Gyankosh)</li> <li>4. <a href="https://www.swayam.gov.in">https://www.swayam.gov.in</a>( SWAYAM PORTAL)</li> </ol>				

<b>PART - D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>	<b>100 Marks</b>	
<b>Continuous Comprehensive Evaluation (CCE)</b>	<b>20 Marks</b>	
<b>Semester End Exam (SEE):</b>	<b>80 Marks</b>	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – <b><math>10 + 10 = 20</math> Marks</b>	
	Section B: Descriptive answer type questions unit wise – <b><math>15 \times 04 = 60</math> Marks</b>	


### Part A: Introduction

Program: Certificate Course		Class: B.Sc. I/II Sem.	Year: 2023	Session: 2023-24
1	Course Code	BCAGEC-I		
2	Course Title	Office Tools		
3	Course Type	Laboratory Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Learn Modern office activities and their software requirements.</li> <li>• Create a new Word document and formatting a document using MS-WORD.</li> <li>• Create an electronic spreadsheet using MS-Excel, familiarize oneself with Excel's basic and advance features.</li> <li>• Create slide show presentation and explore the Microsoft Office PowerPoint environment.</li> </ul>		
6	Credit Values	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: <input checked="" type="checkbox"/> 20	

### Part B: Content of the Course

Total No. of Teaching-learning Hours-30

Section	Topics (Course Contents)	No. of Hours
B	<b>MS WORD:</b> Basic formatting, Paragraph formatting, Page formatting. Home, Insert, Draw, Design, Layout, Mailing tab. Print Options. <b>MS POWER POINT:</b> Creating Presentations, Addition and formatting slides. Effects and Animation. Slide Show, Recording <b>MS EXCEL:</b> Operators in MS EXCEL, basic operations on cell, Using functions, Graph and Charts. <b>Windows:</b> Windows Accessories, System tools, Icons, Desktop	30 hours
<b>Keywords:</b>	DOS, MS-WORD, MS-EXCEL, MS-POWER POINT	

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

#### *Text Books Recommended-*

1. Comdex Computer Course Kit (windows 7 with office 2010), Gupta Vikas. Dreamtech

Dr. B. S. Tiwari

Mr. P. K. Bhattacharya

Mr. S. K. Bhattacharya

Publication

2. Mastering MS Office 2000, Professional Edition by Courier, BPB Publication
3. MS Office 2000 Training Guide by Maria, BPB Publications

**Part D: Assessment & Evaluation**

- Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.
- Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.

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**Part A: Introduction**

Program: Certificate Course		Class: B.Sc. I/II Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC2</b>		
2	Course Title	<b>NETWORK AND HTML</b>		
3	Course Type	<b>GENERIC ELECTIVE COURSE</b>		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• State the use of computer network and different network topologies.</li> <li>• Learn fundamentals of network</li> <li>• Learn fundamentals of HTML.</li> <li>• Design web page using HTML.</li> </ul>		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

**Part B: Content of the Course**

Total No. of Teaching-learning Hours- 45

Module	Topics (Value Added Course)	No. of Hours
I	<b>FUNDAMENTALS OF COMPUTER NETWORK-</b> Computer Network, definition, Types of networks, advantage, Data communication, components of data communication. Introduction To Internet and Intranet, Working of Internet, Client server architecture, Concept of web server, Network Configuration In Windows, Networking Tool- Ipconfig.	11 Hours
II	<b>NETWORKING &amp; NETWORK MODEL</b> – Modes Of Transmission, Guided & Unguided Transmission Media, Internet protocol,(HTTP,HTTPS,FTP,SMTP,IMAP,POP3), Network Topology( RING ,STAR ,BUS ,TREE ,MESH ,HYBRID), <b>Network Models</b> - OSI Reference Model, TCP/IP Model.	11 Hours
III	<b>INTERNET TERMS</b> – WWW, E-Mail, URL, Search Engine, Web Browsers, Web Server, Web Page, Web Site Cookies & Session, Video Conferencing, E-Commerce, M-Commerce, Introduction to IoT, Cloud Computing. <b>Internet Security</b> -Virus & Threat, Effect, Types, Prevention, Antivirus, Ethical Hacking.	11 Hours
IV	<b>INTRODUCTION TO WEB DESIGN</b> – <b>Introduction to HTML:</b> Origin, evolution and importance of HTML, elements of HTML, Head, Title. <b>Body:</b> background, bgcolor, link, vlink, alink, bg properties, margin. <b>Anchor:</b> href, Name, title. Block formatting elements: font, heading, blockquote, line break,	12 Hours

	<p>center, marquee, list elements.</p> <p><b>Forms in HTML:</b></p> <p>Input elements: Textbox, password box, checkbox, radio button, combo box, select elements, option element.</p> <p><b>Information type elements:</b> boldface, italics, strike and subscript.</p> <p><b>Tables in HTML:</b></p> <p>Table elements: border, cell spacing, width, height, align, bicolor, border color, TR element, TD element, TH element, Col Element.</p> <p>Frames: frame and frameset elements.</p>	
<b>Keywords:</b>	Network, Reference model, HTML, tags	

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Text Books:

1. Data communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hill.
2. "The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works" by Douglas E. Comer.
3. "HTML and CSS: Design and Build Websites" by Jon Duckett

Online Resources:

1. <https://www.ndl.gov.in/> (National Digital Library of India)
2. <https://www.swayam.gov.in/> (SWAYAM PORTAL)
3. <https://egyankosh.ac.in/> (E-Gyankosh)
4. <https://www.swayam.gov.in/> (SWAYAM PORTAL)

### PART - D: Assessment and Evaluation

<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>	100 Marks	
<b>Continuous Comprehensive Evaluation (CCE) :</b>	20 Marks	
<b>Semester End Exam (SEE):</b>	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End Exam (SEE):</b>	<b>Paper – Two section – A &amp; B</b> Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

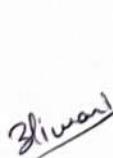
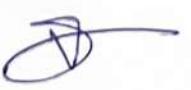

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<b>Part A: Introduction</b>			
Program: Certificate Course	Class: B.Sc. I/II Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC-2</b>	
2	Course Title	<b>NETWORK AND HTML</b>	
3	Course Type	<b>Laboratory Course</b>	
4	Pre-requisite(if any)	As per Govt. Norms	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Understanding basic network configuration</li> <li>• Setting and configure IP using dos.</li> <li>• Design a web page using html elements.</li> <li>• Learn fundamentals of HTML.</li> </ul>	
6	Credit Values	<b>01</b>	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20

<b>Part B: Content of the Course</b>		
Total No. of Teaching-learning Hours-30		
Section	Topics (Course Contents)	No. of Hours
B	<ul style="list-style-type: none"> <li>• Network configuration setting in Windows</li> <li>• Use of ipconfig</li> <li>• Lan setup</li> <li>• Introduction to web browsers and their functionalities</li> <li>• Creating your first HTML document</li> <li>• Text formatting and basic HTML tags (headings, paragraphs, lists)</li> <li>• Understanding HTML elements and their purpose</li> <li>• Working with links and anchors</li> <li>• Adding images and multimedia content</li> <li>• Creating HTML forms to gather user input</li> <li>• Different types of form elements (text fields, radio buttons, checkboxes, etc.)</li> <li>• Working with HTML table.</li> </ul>	30 hours
<b>Keywords:</b>	HTML, Tags, Network, IP	

<b>Part C: Learning Resource</b>	
Text Books, Reference Books, Other Resources	
<b>Text Books Recommended-</b>	
1. "HTML and CSS: Design and Build Websites" by Jon Duckett 2. Internet: The complete reference by Young, McGraw hill	

<b>Part D: Assessment &amp; Evaluation</b>	
<ul style="list-style-type: none"> <li>• Exam pattern shall be followed to computer laboratory norms and questions will be determined by the department /teacher concerned.</li> <li>• Marks distribution in each course shall be determined by the department / course tutor following the guidelines of NEP-20.</li> </ul>	

### Part A: Introduction

Program: Certificate Course		Class: B.Sc. III Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC3T</b>		
2	Course Title	<b>Relational Database Management System</b>		
3	Course Type	<b>Generic Elective Course</b>		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Understand Data, Database system and its architecture.</li> <li>• Apply ER modeling and Relational Database design using Normalization.</li> <li>• Apply concepts of database storage and querying. Understand Concurrency, Recovery and Security mechanism in DBMS.</li> <li>• Understand Current advances in DBMS.</li> </ul>		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/Hours
I	<b>Introduction to DBMS</b> Data & Information, File systems versus Database systems, Schemas and Instances, Data Abstraction, Data Independence, Database languages and Interfaces, DBMS Architecture, Data Independence, Data modeling using Entity - Relationship (ER) Model: Entity sets, attributes and keys, Relationship types, sets, roles and structural constraints, Weak Entity types. Data Models: Relational, Network, Hierarchical. Relational data model concepts.	10 hours/15 periods
II	<b>RDBMS and Design Concepts</b> Codd's 12 rules, Relational Algebra and Relational calculus, SQL Programming Techniques: DDL, DML, DCL query statements, Constraints and Triggers, Views and Indexes. <b>Database Design Concepts</b> Data dependency, Armstrong's Axioms, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF), Relational Database design forms, Algorithms and further dependencies, De-normalization.	10 hours/15 periods
III	<b>Transaction Processing</b> ACID Properties of Transactions, Concurrency control, Transaction support in SQL, Locking Techniques. Database recovery techniques - Shadow paging, Log Based Recovery, ARIES recovery algorithm, Database Security, Deadlock: Detection, Avoidance and Recovery.	10 hours/15 periods
IV	Introduction to Current Trends – Centralized and Client Server Architectures, Distributed Databases, Object Oriented Database, Spatial & Temporal Databases, Data Mining & Warehousing, Data Visualization, Mobile Databases, OODB & XML Databases,	10 hours/15 periods

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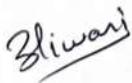
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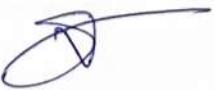
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	Multimedia & Web Databases.	
<b>Keywords:</b>	ER Model, SQL Programming Techniques, Database Security	
<b>Part C: Learning Resource</b>		
Text Books, Reference Books, Other Resources		
Suggested Readings:		
<b>Text Books:</b> <ul style="list-style-type: none"> <li>1. Fundamentals of Database Systems, R Elmasri &amp; S B. Navathe, Pearson Education.</li> <li>2. Database Systems Concepts, A Silberschatz, H F. Korth &amp; S. Sudarshan, McGraw-Hill.</li> <li>3. Fundamentals of Database Management Systems, Mark L. Gillenson, Wiley India Pvt.</li> <li>4. Introduction To Database Systems, C.J.Date, Longman, Pearson Education</li> </ul>		
<b>Reference Books:</b> <ul style="list-style-type: none"> <li>1. Database Systems: A Complete Book, Molina, Ullman, J. Widom, Pearson Education.</li> <li>2. Database Systems: Design, Implementation, and Management, Peter Rob &amp; Carlos Coronel, CENGAGE Learning India Pvt. Ltd., New Delhi.</li> <li>3. Database Systems Using Oracle, Nilesh Shah, PHI Learning Pvt. Ltd., New Delhi.</li> <li>4. Database Management Systems, R Ramakrishnan, J Gehrke, McGraw-Hill Education</li> <li>5. database Development and Management, Lee Chao, Auerbach Publications.</li> </ul>		

<b>PART - D: Assessment and Evaluation</b>		
<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>	<b>100 Marks</b>	
<b>Continuous Comprehensive Evaluation (CCE)</b>	<b>20 Marks</b>	
<b>Semester End Exam (SEE):</b>	<b>80 Marks</b>	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	
Continuous	<b>Assignment – 01 of 10 Marks</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Comprehensive Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks	
	Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	




**Part A: Introduction**

Program: Certificate Course		Class: B.Sc. III Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC3P</b>		
2	Course Title	<b>Lab based SQL</b>		
3	Course Type	<b>Laboratory Course</b>		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. Formulate queries in Structured Query Language (SQL) for database manipulation. 2. Student would be able to create a table, execute queries and SQL programs. 3. Understand, analyze and apply common SQL statements including DDL, DML and DCL statements to perform different operations. 4. Design and implement a database schema for a given problem. 5. Do connectivity of PHP and MySQL to develop applications.		
6	Credit Values	<b>01</b>		
7	Total Marks	Max. Marks: <b>50</b>	Min Passing Marks: <b>20</b>	

**Part B: Content of the Course**

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/Hours
A	1. Creation of databases and execution of SQL queries. 2. Creation of Tables using MySQL: Data types, Creating Tables (along with Primary and Foreign keys), Altering Tables and Dropping Tables. 3. Practicing DML commands- Insert, Select, Update, Delete. 4. Practicing Queries using ANY, ALL, IN, EXISTS, NOT, EXISTS, UNION, INTERSECT, and CONSTRAINTS, etc. 5. Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping. 6. Use of COMMIT, ROLLBACK and SAVEPOINT. 7. Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger. 8. To remove the redundancies and anomalies in the above relational tables, Normalize up to Third Normal Form.	60 hours
<b>Keywords:</b>	Use basic SQL Commands, Triggers	

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### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

#### *Text Books Recommended-*

1. Paul DuBois, "MySQL Cookbook: Solutions for Database Developers and Administrators," Third Edition, O'Reilly Media, 2014.
2. Frank M. Kromann, "Beginning PHP and MySQL: From Novice to Professional," Fifth Edition, Apress, 2018.
3. Joel Murach and Ray Harris, "Murach's PHP and MySQL," First Edition, Mike Murach& Associates, 2010.
4. Luke Welling, Laura Thomson, "PHP and MySQL Web Development," Fourth Edition, Addison-Wesley, 2008.

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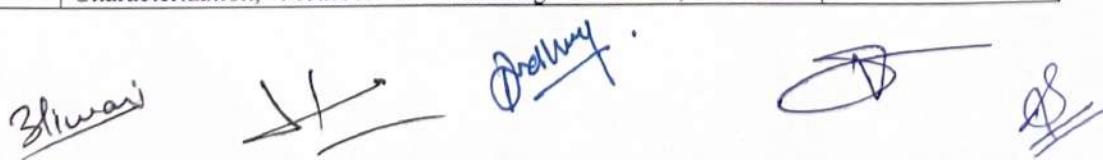
### Part A: Introduction

Program: Certificate Course		Class: B.Se. IV Sem.	Year: 2023	Session: 2023-24
1	Course Code	<b>BCAGEC4T</b>		
2	Course Title	<b>Operating System Principles</b>		
3	Course Type	<b>Generic Elective Course</b>		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. Describe the important computer system resources and the role of operating system in their management policies and algorithms. 2. Understand the process management policies and scheduling of processes by CPU. 3. Evaluate the requirement for process synchronization and coordination handled by operating system. 4. Describe and analyze the memory management and its allocation policies. 5. Identify use and evaluate the storage management policies with respect to different storage Management technologies.		
6	Credit Values	03		
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40	

### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/Hours
I	<b>Introduction to Operating System</b> What is an Operating System, Operating Systems Architecture, Function of Operating System, Booting Process, Types of Operating System: Multi-Programming, Multi-Tasking, Multi-Threading; Operating Systems Classification: Simple Batch Systems, Multi-programmed Batches systems, Time-Sharing Systems, Parallel & Distributed Operating Systems.	10 hours/15 periods
II	<b>Process Management and Deadlocks</b> Process States and Transitions, Cooperating Processes, Inter-process Communication, Threads, CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling, Process Synchronization: The Critical-Section Problem, Semaphores, Monitors, Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock	10 hours/15 periods


  
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	Prevention, Deadlock Avoidance, Recovery from Deadlock.	
III	<b>Memory Management and Files</b> Main Memory Management: Background, Logical versus Physical Address space, swapping, Contiguous allocation, Paging, Segmentation, Virtual Memory: Demand Paging, Page Replacement, Page replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Files: A Simple File System, Logical & Physical File System, File-System Interface: Access Methods, Directory Structure	10 hours/15 periods
IV	<b>Linux:Introduction to Linux</b> History, The Linux Architecture, Features of Linux, Internal and External Commands, Command Structure, difference between Linux and Unix, various Linux distributions, basic commands.	10 hours/15 periods
<b>Keywords:</b>	Deadlock, Memory Management, Linux	

### Part C: Learning Resource

Text Books, Reference Books, Other Resources

#### Suggested Readings:

##### Text Books:

1. Operating System Concepts, Silberschatz and Galvin, Pearson Education Pub.
2. Operating Systems, Madnick E., Donovan J., Tata McGraw Hill,
3. Operating Systems, A. S. Tannenbaum, PHI
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Linux: Complete Reference, 6th Edition, Richard Petersen, Tata McGraw-Hill.

##### Reference Books:

1. Operating Systems Internals and Design Principle, William Stallings, Prentice Hall Publishers.
2. Operating Systems- AConcept-Based Approach, Dhananjay M. Dhamdhere, McGraw-Hil.

### PART - D: Assessment and Evaluation

<b>Suggested Continuous Evaluation Methods:</b>		
<b>Maximum Marks:</b>	100 Marks	
<b>Continuous Comprehensive Evaluation (CCE)</b>	20 Marks	
<b>Semester End Exam (SEE):</b>	80 Marks	
<b>Internal Assessment:</b>	<b>Class Test – 02 of 10 Marks Each</b>	Average of the marks obtained in both test (out of 10) and marks obtained in assignment (out of 10) shall be considered against 20 Marks of Internal assessment
Continuous	<b>Assignment – 01 of 10 Marks</b>	
Comprehensive		
Evaluation (CCE)		
<b>Semester End</b>	<b>Paper – Two section – A &amp; B</b>	
<b>Exam (SEE):</b>	Section A: Objective and Short answer type questions – $10 + 10 = 20$ Marks	
	Section B: Descriptive answer type questions unit wise – $15 \times 04 = 60$ Marks	

### Part A: Introduction

Program: Certificate Course		Class: B.Sc. IV Sem.	Year: 2023	Session: 2023-24
1	Course Code	BCAGEC4P		
2	Course Title	Lab based on OS		
3	Course Type	Laboratory Course		
4	Pre-requisite(if any)	As per Govt. Norms		
5	Course Learning Outcomes (CLO)	1. To demonstrate the basic knowledge of Linux commands. 2. To create the directory, how to change and remove the directory. 3. Use of windows operating system. 4. Simulate and demonstrate the concepts of operating systems. 5. To recognize common Windows Control Panel categories.		
6	Credit Values	01		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20	

### Part B: Content of the Course

Total Lectures: 60 hours

Section	Topics (Course Contents)	No. of Period/Hours
A	<b>LINUX:</b> 1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd. 2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, date. 3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.	30 hours
B	<b>MS-DOS:</b> DOS INTERNAL AND EXTERNAL COMMANDS. <b>CONTROL PANEL :</b> <b>Task:</b> 1. Configure an HomeGroup. 2. Require a password to be entered when the computer comes out of sleep mode. 3. Enable screen reading for any text show on the screen. 4. Determine whether a computer is on a domain or workgroup. 5. Access Device Manager. 6. Customize the Start button menu. 7. Configure whether hidden files display.	30 hours

<b>Part A: Introduction</b>						
Program: Certificate Course	Class: B.Sc./BCA 1 - 4 <sup>th</sup> Semester	Year: 2023	Session: 2023-24			
1	Course Code	<u>CASET CASC-1</u>				
2	Course Title	<b>ESSENTIAL OF PYTHON</b>				
3	Course Type	<b>SKILL INHENCEMENT COURSE</b>				
4	Pre-requisite(if any)	As per Govt. Norms				
5	Course Learning Outcomes (CLO)	1. Explain the fundamentals of Computers. 2. Explain the basic concepts of Python Programming. 3. Demonstrate proficiency in the handling of loops and the creation of functions. 4. Identify the methods to create and store strings.				
6	Credit Values	02				
7	Total Marks	Max. Marks: 50	Min Passing Marks: 20			
<b>Part B: Content of the Course</b>						
Total Hours: 60						
Unit	Topics (Course Contents)		No. of Period/Hours			
I	<b>INTRODUCTION TO PYTHON</b> History, Version of Python, Real Time Applications of Python, Features of Python, Keywords. IDE-Anaconda, VS Code, Python IDE		10 hours			
II	<b>DATA REPRESENTATION</b> Data Representation in Python: Literals or Values, Identifiers or Variables, Data Types: Fundamental, Sequence, List, Set, Dict, NoneType. Type Casting Techniques in Python.		20 hours			
III	<b>OPERATORS &amp; EXPRESSIONS</b> Arithmetic, Assignment, Relational, Logical, Bitwise, Membership, Identity Operators. String Handling in Python.		10 hours			
IV	<b>CONTROL STRUCTURES IN PYTHON</b> Conditional Statement: Simple if Statement, if-else, if-elif-else, Match Case Statement. Looping Statement: While, for, Nested or Inner Loop. Misc. Flow Control Statement : break, continue, pass.		20 hours			
<b>Keywords:</b>	Data Types, Operators, Looping Statements					
<b>Part C: Learning Resource</b>						
Text Books, Reference Books, Other Resources						
Suggested Readings:						
<b>Text Books:</b>						
1. "Effective Python: 90 Specific Ways to Write Better Python" by Brett Slatkin. 2. "Python Crash Course" by Eric Matthes.						
<b>Online Resources:</b>						
1. <a href="https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources">https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources</a> 2. <a href="https://www.ndl.gov.in/">https://www.ndl.gov.in/</a> (National Digital Library of India) 3. <a href="https://www.swayam.gov.in/">https://www.swayam.gov.in/</a> ( SWAYAM PORTAL) <a href="https://egyankosh.ac.in/">https://egyankosh.ac.in/</a> ( E-Gyankosh)						

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Part A: Introduction			
Program: Certificate Course	Class: B.Sc./BCA 1 - 4 <sup>th</sup> Semester	Year: 2023	Session:2023-24
1	Course Code	BCAVAC1	
2	Course Title	ICT based Learning	
3	Course Type	VALUE ADDED COURSE	
4	Pre-requisite(if any)	As per Govt. Norms	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> <li>• Understand the concept of Blended learning</li> <li>• To provide knowledge about various OER resources</li> <li>• Create document using tools word, Google Docs</li> <li>• Learn about various Google tools.</li> </ul>	
6	Credit Values	02	
7	Total Marks	Max. Marks:50	Min Passing Marks: 20

#### Part B: Content of the Course

Total Lectures:

Unit	Topics (Course Contents)	No. of Period/ Hours
I	<b>ICT in Education</b> - Concept & Importance of ICT, Need of ICT in Education, Scope of ICT: Teaching Learning Process, Publication Evaluation, Research and Administration, Challenges in Integrating ICT in Higher Education.	7 Hours
II	Introduction to Blended Learning, terminology, types of Blended Learning Models, Advantages and Disadvantages, Benefits of Blended Learning. <b>E-Learning &amp; Web Based Learning</b> - E-Learning, Web Based Learning, Virtual Classroom, EDUSAT	8 Hours
III	Introduction to Open Educational Resource, Advantages & Disadvantages of OER, OER Tools Like Google Classroom, what is Search Engine, Education Website, Simple Search Tips and Techniques	7 Hours
IV	<b>Presentation Tools</b> – MS Word, MS Excel, MS PowerPoint, WPS Office <b>Google Tools</b> - Google Forms, Google Classroom, Google Meet, Google Docs, Google Sheet, Google Slides. <b>Meeting Management Tools</b> - how to handle Different Types of Meeting Tools and Uses Like Google Meet, Zoom, Skype etc	8 Hours

**Keywords:** Blended Learning, OER, Google

#### Part C: Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

**Text Books:**

1. Agarwal J.P. (2013): Modern Educational Technology. Black Prints, Delhi.
2. Barton,R.(2004).Teaching Secondary Science with ICT. McGraw Hill International .
3. Bhaskar Rao (2013): Samachara Prasara Sankethika vidya Shastramu, Masterminds, Guntur.
4. Cambridge, D.(2010).E-Portfolios for Lifelong Learning and Assessment. John Wiley and Sons.

**Online Resources:**

1. <https://www.unesco.org/en/communication-information/open-solutions/open-educational-resources>
2. <https://www.ndl.gov.in/> (National Digital Library of India)
3. <https://www.swayam.gov.in/> ( SWAYAM PORTAL)
4. <https://egyankosh.ac.in/> ( E-Gyankosh)