

<b>Course Title:</b> Computer Organisation <b>Course Code:</b> BCA-DSC-2(Maj)-201	
<b>Course Outline</b>	This course will enable the student to understand the working of logic gates, Boolean laws and the basics of digital logic circuits in computer hardware organization. The course will familiarize the student with design and implementation of electronic circuits used in internal computer hardware architecture for various arithmetic, logic and shift micro-operations of the microprocessor.
<b>Course Outcome</b>	CO1: Understand concept of number systems, binary arithmetic and computer codes with its application in digital design. CO2: Learn characteristic and working of different logic gates. CO3: Design and simplify logic circuits using boolean algebra and K Maps. CO4: Demonstrate the working of various combinational and sequential circuits used as basic building blocks in internal hardware architecture.
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Describe the fundamental components and architecture of computer systems.</li> <li>• Data Representation: Explain how data is represented and processed within a computer.</li> <li>• Instruction Execution: Understand how instructions are fetched, decoded, and executed.</li> <li>• Memory Hierarchy: Analyse memory hierarchy and its impact on performance.</li> <li>• System Performance: Evaluate factors affecting computer system performance and efficiency.</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT I</b></p> Number System and its conversion: Binary, Octal, Decimal, Hexadecimal; Binary Arithmetic: addition, subtraction, multiplication, division; 8 Bit Signed Arithmetic: signed magnitude, 1's and 2's complement method; Information Representation: fixed and floating point representation; Computer codes: types of codes, BCD, Excess-3, Gray Code, alphanumeric codes – ASCII, EBCDIC, Error detecting and correcting codes- parity, block parity, checksum, CRC and hamming codes. <p style="text-align: center;"><b>UNIT II</b></p> Logic gates and their characteristics: fan in/ fan out, propagation delay, power dissipation, noise margin, IC logic families; Basic Boolean Algebra: Boolean laws, duality principle, Demorgan theorem, minterm and maxterms, standard form, conversion to canonical form, simplification of circuit design by solving boolean expressions and Karnaugh map; Universal Gates: conversion of circuits in terms of NAND or NOR only. <p style="text-align: center;"><b>UNIT III</b></p> Combinational Circuit Design – Adders: Half adder, Full adder, Serial & n bit Parallel Adder, FA using two HAs; Subtractors: Half and Full Subtractor (n bit FS by 1's and 2's Complement); Code Convertors: Decoder and Encoder; Chip Cascading: 4x16, 5x32 decoder using 2x4 and 3x8 decoders; Multiplexer, Demultiplexer and their applications. <p style="text-align: center;"><b>UNIT IV</b></p> Sequential Circuit Design – Flip Flops : Bistable circuit, SR FF, edge triggered with preset & clear, D Type FF, propagation delay, setup & hold time, JK FF, avoidance

	of race around condition in JK M/S FF, Toggle FF ; Working of Register and Shift Registers : SISO, SIPO, PISO, PIPO ; Counters : Asynchronous n bit counter, Up Down counter, Synchronous counter, applications and comparison.
<b>Required Text</b>	1. M. Morris Mano, 2016: Digital Logic and Computer Design, Pearson India Education Services Pvt. Ltd.
<b>Suggested Text, readings and Materials</b>	1. F. J. Hill, G.R. Peterson, 2009 Introduction to Switching Theory & Logic Design, John Wiley & Sons Inc. 2. Thomas L. Floyd, 2013: Digital Fundamentals – A Systems Approach, Pearson International.
<b>Pedagogy for Course Delivery</b>	Lectures, Practical implementations, discussions, Assignments
<b>Evaluation Criteria</b>	10 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar & Assignments) and Attendance. 90 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Introduction to Artificial Intelligence and Data Science <b>Course Code:</b> BCA-DSC-2(Maj)-202	
<b>Course Outline</b>	The course will help students to learn the basics of Artificial Intelligence and Data Science. It further aims to make them analyze data using spreadsheets.
<b>Course Outcome</b>	CO1: Understand basics of Artificial Intelligence and Data Science CO2: Analyse data using spreadsheet software. CO3: Visualize, search and summarize the data using spreadsheet.
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• This subject typically focuses on equipping students with foundational knowledge and practical skills in both fields.</li> <li>• Use of basic data science methods for data analysis and visualization.</li> <li>• Address real-world issues using AI and data science approaches.</li> <li>• Execute basic AI algorithms and models.</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p>Introduction to Artificial Intelligence (AI): Definition, Types of AI, History of AI, Applications of AI in healthcare, education and agriculture, Introduction to key technologies of AI: Machine Learning, Deep Learning, Natural Language Processing (NLP), Computer Vision, Robotics; Ethical issues and Future of AI. Problem Solving: AI problems, Agents and Environments, Structure of Agents.</p> <p style="text-align: center;"><b>UNIT – II</b></p> <p>Data Science: Introduction to Data Science, evolution and need for Data Science, Types of Data, Data Science Applications in Various Fields, Data Science Life Cycle or Project Stages, Data collection, Data Pre-Processing Overview – Data Cleaning, Data Integration and Transformation, Data Reduction – Data Discretization, Data Storage and management, careers in Data Science</p> <p style="text-align: center;"><b>UNIT - III</b></p> <p>Managing Data with Spreadsheet Software: Creating a database, sorting&amp; filtering data, custom sorting and advanced filtering, defining and grouping database ranges, applying data tools like data validation, removing duplicates, text to columns, Flash fill; Managing data using Math, statistical, Trigonometric, String/Text, Date and Time, logical and Database functions, Nested functions. 13</p> <p style="text-align: center;"><b>UNIT - IV</b></p> <p>Data Visualization, Searching and Summarizing using Spreadsheet Software: Understanding Chart types, Creating Embedded Charts, formatting Charts: Changing Chart types, adding Titles, Legends and Gridlines, Printing Charts, searching data using HLOOKUP and VLOOKUP, summarizing data using pivot table, analyzing data using What-if Analysis: goal seek, scenario manager and data Table.</p>
<b>Required Text</b>	<ol style="list-style-type: none"> <li>1. D. Venu Gopal, Data Science and Artificial Intelligence for Beginners Paperback</li> <li>2. Sudhir Reddy Navar, Introduction to AI/ML and Data Science Paperback</li> <li>3. Raju, Data Science: A Beginner's Guide Paperback</li> </ol>

<b>Suggested readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Kevin Knight, Elaine Rich, B. Nair - Artificial Intelligence, TMH</li> <li>2. Manish Nigam, Data Analysis with Excel Paperback, BPB Publications</li> <li>3. Mali, L., Libre Office 1 Writer, Calc: Math Formula Book- Vol 1. Notion Press.</li> <li>4. L. Winston Wayne, Microsoft Excel: Data Analysis &amp; Business Model Paperback</li> </ol>
<b>Pedagogy for Course Delivery</b>	Lectures, Practical implementations, discussions, Assignments
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Practical Based on BCA-DSC-2(Maj)-202 <b>Course Code:</b> BCA-DSC-2(Maj)-202P	
<b>Course Outline</b>	This course explores basic concepts of AI and data science. It covers data collection, cleaning, and visualization. Students learn fundamental statistics, machine learning algorithms, and neural networks. Ethical issues in AI are discussed, and practical applications are explored.
<b>Course Outcome</b>	CO1: Analyse data using spreadsheet software. CO2: Visualize, search and summarize the data using spreadsheet.
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Import, organize, and clean data in Excel.</li> <li>• Perform basic statistical analysis and use Excel functions to analyze data.</li> <li>• Create and customize charts and graphs to visualize data trends and patterns.</li> <li>• Solve real-world problems by applying Excel-based data analysis techniques.</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p>Introduction to Artificial Intelligence (AI): Definition, Types of AI, History of AI, Applications of AI in healthcare, education and agriculture, Introduction to key technologies of AI: Machine Learning, Deep Learning, Natural Language Processing (NLP), Computer Vision, Robotics; Ethical issues and Future of AI. Problem Solving: AI problems, Agents and Environments, Structure of Agents.</p> <p style="text-align: center;"><b>UNIT – II</b></p> <p>Data Science: Introduction to Data Science, evolution and need for Data Science, Types of Data, Data Science Applications in Various Fields, Data Science Life Cycle or Project Stages, Data collection, Data Pre-Processing Overview – Data Cleaning, Data Integration and Transformation, Data Reduction – Data Discretization, Data Storage and management, careers in Data Science</p> <p style="text-align: center;"><b>UNIT - III</b></p> <p>Managing Data with Spreadsheet Software: Creating a database, sorting&amp; filtering data, custom sorting and advanced filtering, defining and grouping database ranges, applying data tools like data validation, removing duplicates, text to columns, Flash fill; Managing data using Math, statistical, Trigonometric, String/Text, Date and Time, logical and Database functions, Nested functions. 13</p> <p style="text-align: center;"><b>UNIT - IV</b></p> <p>Data Visualization, Searching and Summarizing using Spreadsheet Software: Understanding Chart types, Creating Embedded Charts, formatting Charts: Changing Chart types, adding Titles, Legends and Gridlines, Printing Charts, searching data using HLOOKUP and VLOOKUP, summarizing data using pivot table, analyzing data using What-if Analysis: goal seek, scenario manager and data Table.</p>
<b>Required Text</b>	<ol style="list-style-type: none"> <li>1. D. Venu Gopal, Data Science and Artificial Intelligence for Beginners Paperback</li> <li>2. Sudhir Reddy Navar, Introduction to AI/ML and Data Science Paperback</li> <li>3. 3. Raju, Data Science: A Beginner's Guide Paperback</li> </ol>

<b>Suggested readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Kevin Knight, Elaine Rich, B. Nair - Artificial Intelligence, TMH</li> <li>2. Manish Nigam, Data Analysis with Excel Paperback, BPB Publications</li> <li>3. Mali, L., Libre Office 1 Writer, Calc: Math Formula Book- Vol 1. Notion Press.</li> <li>4. L. Winston Wayne, Microsoft Excel: Data Analysis &amp; Business Model Paperback</li> </ol>
<b>Pedagogy for Course Delivery</b>	Hands-on learning with real datasets. Students engage in guided exercises to master data management, analysis, and visualization using Excel tools. Instruction includes demonstrations of key techniques and features, followed by individual or group tasks that apply these skills to practical problems.
<b>Evaluation Criteria</b>	50 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Object Oriented Programming Using C++ <b>Course Code:</b> BCA-DSC-2(MIN)-203	
<b>Course Outline</b>	By the end of the course, students will be able to write C++ programs using the more esoteric language features, utilize Object Oriented techniques to design C++ programs, use the standard C++ library, and explore advanced C++ techniques.
<b>Course Outcome</b>	CO1: Understand the features and importance of object-oriented programming concepts. CO2: Use the concepts like inheritance, polymorphism, and dynamic binding to develop codes. CO3: Gets better understanding of developing reusable components using C++ programming. CO4: Develop of large software that needs bottom up and better modular approach. .
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Explain core object-oriented programming concepts like encapsulation, inheritance, and polymorphism.</li> <li>• Design and implement classes and objects in C++.</li> <li>• Apply principles of resource management and exception handling.</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p><b>Principles of Object-Oriented Programming (OOP):</b> Introduction to OOP, Difference between OOP and Procedure Oriented Programming; Concepts: Object, Class, Encapsulation, Abstraction, Polymorphism and Inheritance, Applications of OOP. Special operators: scope resolution operator, Member Dereferencing operators, Memory management operators, Manipulators and Type cast operator. Structure of a C++ Program and Classes and Objects: <b>Class Declaration:</b> Data Members, Member Functions, Private and Public members, Creating Objects, accessing class data members, Accessing member functions; <b>Class Function Definition:</b> Member Function definition inside the class declaration and outside the class declaration.</p> <p style="text-align: center;"><b>UNIT - II</b></p> <p>Friend function, inline function, Static data members, Function Overloading, Arrays within a class. Arrays of Objects; Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects. Constructors: Declaration and Definition, Types of Constructors, (Default, Parameterized, Copy Constructors). <b>Destructors:</b> Definition and use. Operator Overloading: Concept of Operator Overloading, Overloading unary and binary operators.</p> <p style="text-align: center;"><b>UNIT - III</b></p> <p><b>Inheritance:</b> Extending Classes Concept of inheritance, Base class, defining derived classes, Visibility modes: Public, Private, Protected; <b>Types of Inheritance:</b> Single inheritance: Privately derived, publicly derived; Making a protected member inheritable, multilevel inheritance, multiple Inheritance and ambiguity of multiple inheritance, Hierarchal Inheritance, Hybrid, Nesting of classes. <b>Polymorphism:</b> Definition, Application and demonstration of Data Abstraction, Encapsulation and Polymorphism, Static and Dynamic Polymorphism, Virtual Functions, pure virtual functions.</p>

	<b>UNIT – IV</b>
	<b>Exception Handling:</b> Definition, Exception Handling Mechanism: Throwing mechanism and Catching Mechanism, Rethrowing an Exception File Processing: Opening and closing of file, Binary file operations, structures and file operations, classes and file operations, Random file processing.
<b>Required Text</b>	1. E. Balaguruswamy, 2008: Object Oriented Programming with C++, TMH. Further Reading 2. Bjarne Stroustrup, 2009: The C++ Programming Language, Addison-Wesley Publishing Company.
<b>Suggested Text, readings and Materials</b>	1. Robert Lafore, 2003 : Object Oriented Programming in Turbo C++, Galgotia Pub. 2. Salaria, R. S. : Object Oriented Programming Using C++, Khanna Book Publishing Co.
<b>Pedagogy for Course Delivery</b>	Lectures, Practical implementations, discussions, Assignments
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Practical Based on BCA-DSC-2(Min)-203 <b>Course Code:</b> BCA-DSC-2(Min)-203P	
<b>Course Outline</b>	It involves hands-on exercises focused on implementing key OOP concepts. Students will work on designing and coding classes, utilizing constructors and destructors, and applying inheritance and polymorphism. Practical tasks include developing practical assignments to reinforce class design, method overriding, and resource management.
<b>Course Outcome</b>	CO1: Apply OOP principles like inheritance and polymorphism in practical coding tasks. CO2: Develop and manage practicals demonstrating strong object-oriented design and problem-solving skills.
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Develop and debug software projects demonstrating object-oriented design and problem-solving abilities.</li> <li>• Create and utilize classes and objects effectively in C++</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p><b>Principles of Object-Oriented Programming (OOP):</b> Introduction to OOP, Difference between OOP and Procedure Oriented Programming; Concepts: Object, Class, Encapsulation, Abstraction, Polymorphism and Inheritance, Applications of OOP. Special operators: scope resolution operator, Member Dereferencing operators, Memory management operators, Manipulators and Type cast operator. Structure of a C++ Program and Classes and Objects: <b>Class Declaration:</b> Data Members, Member Functions, Private and Public members, Creating Objects, accessing class data members, Accessing member functions; <b>Class Function Definition:</b> Member Function definition inside the class declaration and outside the class declaration.</p> <p style="text-align: center;"><b>UNIT - II</b></p> <p>Friend function, inline function, Static data members, Function Overloading, Arrays within a class. Arrays of Objects; Objects as function arguments: Pass by value, Pass by reference, Pointersto Objects. Constructors: Declaration and Definition, Types of Constructors, (Default, Parameterized, Copy Constructors). <b>Destructors:</b> Definition and use. Operator Overloading: Concept of Operator Overloading, Overloading unary and binary operators.</p> <p style="text-align: center;"><b>UNIT - III</b></p> <p><b>Inheritance:</b> Extending Classes Concept of inheritance, Base class, defining derived classes, Visibility modes: Public, Private, Protected; <b>Types of Inheritance:</b> Single inheritance: Privately derived, publicly derived; Making a protected member inheritable, multilevel inheritance, multiple Inheritance and ambiguity of multiple inheritance, Hierarchal Inheritance, Hybrid, Nesting of classes. <b>Polymorphism:</b> Definition, Application and demonstration of Data Abstraction, Encapsulation and Polymorphism, Static and Dynamic Polymorphism, Virtual Functions, pure virtual functions.</p> <p style="text-align: center;"><b>UNIT – IV</b></p> <p><b>Exception Handling:</b> Definition, Exception Handling Mechanism: Throwing mechanism and Catching Mechanism, Rethrowing an Exception File Processing:</p>

	Opening and closing of file, Binary file operations, structures and file operations, classes and file operations, Random file processing.
<b>Required Text</b>	<ol style="list-style-type: none"> <li>1. E. Balaguruswamy, 2008: Object Oriented Programming with C++, TMH. Further Reading</li> <li>2. Bjarne Stroustrup, 2009: The C++ Programming Language, Addison-Wesley Publishing Company.</li> </ol>
<b>Suggested Text, readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Robert Lafore, 2003 : Object Oriented Programming in Turbo C++, Galgotia Pub.</li> <li>2. Salaria, R. S. : Object Oriented Programming Using C++, Khanna Book Publishing Co.</li> </ol>
<b>Pedagogy for Course Delivery</b>	Hands-on coding exercises and project work. Students start with guided practice on core OOP concepts, followed by individual assignments to apply these principles. Regular coding labs, peer reviews, and instructor feedback help reinforce learning.
<b>Evaluation Criteria</b>	50 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Management Information System <b>Course Code:</b> CSA-MDC102/202/302	
<b>Course Outline</b>	By the end of the course, students will be able to write C++ programs using the more esoteric language features, utilize Object Oriented techniques to design C++ programs, use the standard C++ library, and explore advanced C++ techniques.
<b>Course Outcome</b>	CO1: Understand the features and importance of object-oriented programming concepts. CO2: Use the concepts like inheritance, polymorphism, and dynamic binding to develop codes. CO3: Gets better understanding of developing reusable components using C++ programming. CO4: Develop of large software that needs bottom up and better modular approach. .
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• Explain core object-oriented programming concepts like encapsulation, inheritance, and polymorphism.</li> <li>• Design and implement classes and objects in C++.</li> <li>• Apply principles of resource management and exception handling.</li> </ul>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p><b>Principles of Object-Oriented Programming (OOP):</b> Introduction to OOP, Difference between OOP and Procedure Oriented Programming; Concepts: Object, Class, Encapsulation, Abstraction, Polymorphism and Inheritance, Applications of OOP. Special operators: scope resolution operator, Member Dereferencing operators, Memory management operators, Manipulators and Type cast operator. Structure of a C++ Program and Classes and Objects: <b>Class Declaration:</b> Data Members, Member Functions, Private and Public members, Creating Objects, accessing class data members, Accessing member functions; <b>Class Function Definition:</b> Member Function definition inside the class declaration and outside the class declaration.</p> <p style="text-align: center;"><b>UNIT - II</b></p> <p>Friend function, inline function, Static data members, Function Overloading, Arrays within a class. Arrays of Objects; Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects. Constructors: Declaration and Definition, Types of Constructors, (Default, Parameterized, Copy Constructors). <b>Destructors:</b> Definition and use. Operator Overloading: Concept of Operator Overloading, Overloading unary and binary operators.</p> <p style="text-align: center;"><b>UNIT - III</b></p> <p><b>Inheritance:</b> Extending Classes Concept of inheritance, Base class, defining derived classes, Visibility modes: Public, Private, Protected; <b>Types of Inheritance:</b> Single inheritance: Privately derived, publicly derived; Making a protected member inheritable, multilevel inheritance, multiple Inheritance and ambiguity of multiple inheritance, Hierarchal Inheritance, Hybrid, Nesting of classes. <b>Polymorphism:</b> Definition, Application and demonstration of Data Abstraction, Encapsulation and Polymorphism, Static and Dynamic Polymorphism, Virtual Functions, pure virtual functions.</p>

	<b>UNIT – IV</b>
	<b>Exception Handling:</b> Definition, Exception Handling Mechanism: Throwing mechanism and Catching Mechanism, Rethrowing an Exception File Processing: Opening and closing of file, Binary file operations, structures and file operations, classes and file operations, Random file processing.
<b>Required Text</b>	1. E. Balaguruswamy, 2008: Object Oriented Programming with C++, TMH. Further Reading 2. Bjarne Stroustrup, 2009: The C++ Programming Language, Addison-Wesley Publishing Company.
<b>Suggested Text, readings and Materials</b>	3. Robert Lafore, 2003 : Object Oriented Programming in Turbo C++, Galgotia Pub. 4. Salaria, R. S. : Object Oriented Programming Using C++, Khanna Book Publishing Co.
<b>Pedagogy for Course Delivery</b>	Lectures, Practical implementations, discussions, Assignments
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Seminar, Project & Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> English-2 <b>Course Code:</b> AEC-2-201	
<b>Course Outline</b>	Learn to utilize literary terms and vocabulary, critical methods, and various lenses of interpretation in writing in English.
<b>Course Outcome</b>	<ol style="list-style-type: none"> <li>1. Learn to compose comprehensive and well-structured paragraphs</li> <li>2. Learn to utilize literary terms and vocabulary, critical methods, and various lenses of interpretation in their writing</li> <li>3. To apply rules of grammar</li> <li>4. To learn the formatting and documenting conventions of the discipline.</li> </ol>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT - I</b></p> <p>Reading (Text: Interact: A Course in Communicative English, Cambridge)</p> <ol style="list-style-type: none"> <li>1. Close Reading 2. Comprehension 3. Summary 4. Paraphrasing 5. Interpreting Graphs and Charts</li> </ol> <p style="text-align: center;"><b>Unit II</b></p> <p>Writing (Text: Writing Skills, Cambridge, 03-57)</p> <ol style="list-style-type: none"> <li>1. Paragraph Writing (Available in Print and e-book: Effective Academic Writing I&amp;II, Alice Savage &amp; Patricia Mayer, OUP (USA, 2006) 2. Note-Making</li> <li>3. Letter/E-mail Writing 4 4. Resume Writing 5. Report Writing</li> </ol>
<b>Required Text</b>	<ul style="list-style-type: none"> <li>• On Track: English Skills for Success, Orient BlackSwan.</li> <li>• Embark: English for Undergraduates, Steve Hart, Arvind R. Nair and Veena Bharti, Cambridge University Press</li> </ul>
<b>Suggested Text, readings and Materials</b>	<ul style="list-style-type: none"> <li>• Connect: Course in Communicative English, Debashis Bandyopadhyay and Malathi Krishnan, Cambridge University Press.</li> <li>• Enrich Your English, S.R. Inthira and V. Saraswathi, Oxford University Press.</li> <li>• Communication and Language Skills, Sanghita Sen, et al, Cambridge University Press.</li> <li>• Practical English, K.K. Singh, APH Publishing Corporation.</li> </ul>
<b>Pedagogy for Course Delivery</b>	Lectures, discussions, Assignments
<b>Evaluation Criteria</b>	The 5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Assignments and class tests) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title:</b> Desktop publishing using GIMP <b>Course Code:</b> CSA-SEC102/202/302	
<b>Course Outline</b>	The course will teach students the basics and advance concepts of GIMP. The course will make the students skilful in using GIMP in professional areas like flex designing, image processing, digital photography, desktop publishing, cover design and poster/banner making etc.
<b>Course Outcome</b>	After completing this course students will be able to: <ol style="list-style-type: none"> <li>1. Understand the basics of image, image formats, and color models.</li> <li>2. Get a thorough knowledge of GIMP.</li> <li>3. To use GIMP for desktop publishing.</li> <li>4. To use GIMP for digital photography.</li> <li>5. To use the GIMP for image processing and poster/cover/banner design.</li> </ol>
<b>Course content/Syllabus</b>	<p style="text-align: center;"><b>UNIT-I</b></p> <p>Introduction to GIMP: Downloading and Installing GIMP, Working with GIMP's Interface, Toolbox, Windows and Menus in GIMP, Dockable Dialogs or Dockable Panels, Images and Canvases.</p> <p>Basic Computer Graphics: Digital Images vs. Traditional Photographs, Raster Graphics vs. Vector Graphics, , File Formats, Image basics, Color Depth, Color Spaces and Color Modes, Image Compression, Image resolution, Checking image resolution in GIMP, Resolution for Printed Images, Saving a JPG, PNG, PSD, and TIF File in GIMP, Saving (Exporting) and Reducing JPG File Size.</p> <p style="text-align: center;"><b>UNIT-II</b></p> <p>Working with Files; Opening Files, Working in the Image Window, Copying and Pasting, Saving Files.</p> <p>Working with Images: Selection Tools, Image Tools, Transform Tools, Straightening or Rotating an Image, Cropping an Image, Changing the Size of an Image, Paint Tools, Color Tools,</p> <p>Drawing in GIMP; Tools for Drawing, Drawing with Selections, Drawing Freely,</p> <p style="text-align: center;"><b>UNIT-III</b></p> <p>Fixing Problems in Images; Analyzing Your Colors with Info Tools, Color Balance, Equalize, White Balance Color Enhance Normalize Stretch Contrast, Stretch HSV, Correcting with Brightness (Contrast), Improving Tones in Images with Levels.</p> <p>Correcting a Dull Image with Curves, Improving Color and Tone with Curves, Color Too Strong (Oversaturated), Hue-Saturation, Noisy Image Sharpening an Image To Sharpen an Image with Unsharp Mask, Using Brushes to Repair Images, Unwanted Spots or Blotches, Removing Spots with the Smudge Brush, Removing Spots with the Healing Brush.</p> <p style="text-align: center;"><b>UNIT-IV</b></p> <p>Working with Text; Uses for Text in Images, Adding and Editing Text, Customizing Text from the Text Panel, Making Text Go Along a Path, Using Text to Create a Path.</p> <p>Working with Layers and Masks; Managing Layers, Layers Dialog, Adding, Duplicating, and Removing Layers, Arranging Layers in the Stack, , Grouping and</p>

	Merging Layers, Manipulating Layers, Resizing Layers, Working with Layer Transparency, Using Layer Masks.
<b>Required Text</b>	GIMP for Absolute Beginners by Jan Smith and Roman Joost, Apress
<b>Suggested Text, readings and Materials</b>	GIMP Bible, Jason van Gumster, Robert Shimonski, Wiley Publishing
<b>Pedagogy for Course Delivery</b>	Lectures, Practical implementations, discussions, Assignments
<b>Evaluation Criteria</b>	75 marks will be external assessment based on performance in examinations conducted and Mid-Semester Test, Academic Activity (Seminar, Project, practicals & Assignments) and Attendance by the college.

**Course Title: Punjabi-2**  
**Course Code: PUN-COMPL-2- 201**

<b>Course Outline</b>	<ul style="list-style-type: none"> <li>• ਇਸ ਕੋਰਸ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਬਾਰੇ ਗਿਆਨ ਪ੍ਰਾਪਤ ਕਰਨਗੇ।</li> <li>• ਇਸ ਕੋਰਸ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਨਾਲ ਸੰਬੰਧਿਤ ਵਿਭਿੰਨ ਰਵਾਇਤਾਂ ਦਾ ਗਿਆਨ ਪ੍ਰਾਪਤ ਕਰਨਗੇ।</li> <li>• ਇਸ ਕੋਰਸ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਵਿਹਾਰਕ ਪੰਜਾਬੀ ਬਾਰੇ ਡੂੰਘਾਈ ਨਾਲ ਜਾਣ ਸਕਣਗੇ।</li> </ul>
<b>Student Learning Outcomes</b>	<ul style="list-style-type: none"> <li>• ਇਸ ਕੋਰਸ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ ਸੰਬੰਧੀ ਭਰੋਸੇਯੋਗ ਸਮਝ ਪੈਦਾ ਕਰਨ ਦੇ ਸਮਰੱਥ ਹੋਣਗੇ।</li> <li>• ਇਸ ਅਧਿਐਨ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਪੰਜਾਬੀ ਜਨ ਜੀਵਨ ਦੀਆਂ ਬਰੀਕੀਆਂ ਸਮਝ ਸਕਣਗੇ।</li> <li>• ਵਿਹਾਰਕ ਅਧਿਐਨ ਰਾਹੀਂ ਵਿਦਿਆਰਥੀ ਆਮ ਜੀਵਨ ਵਿਚ ਪੰਜਾਬੀ ਦੀ ਵਰਤੋਂ ਦੇ ਸਮਰੱਥ ਹੋ ਸਕਣਗੇ।</li> </ul>
<b>Course content/Syllabus</b>	<p>Unit-I: ਪੁਸਤਕ ‘ਪੰਜਾਬ ਦੇ ਲੋਕ ਗੀਤ’-ਸੰਪਾ. ਮਹਿੰਦਰ ਸਿੰਘ ਰੰਧਾਵਾ ਤੇ ਦੇਵਿੰਦਰ ਸਤਿਆਰਥੀ, ਸਾਹਿਤਯ ਅਕਾਦੇਮੀ ਦਿੱਲੀ ਇਸ ਪੁਸਤਕ ਵਿਚੋਂ ਪੰਨਾ-315 ਤੋਂ ਲੈ ਕੇ 352 ਤੱਕ ਦੇ ਲੋਕਗੀਤ ਕੋਰਸ ਵਿਚ ਨਿਰਧਾਰਤ ਹਨ। (ੳ) ਕਿਸੇ ਇਕ ਲੋਕਗੀਤ ਦਾ ਕੇਂਦਰੀ ਭਾਵ ਦੱਸਕੇ, ਵਿਸ਼ਾ ਵਸਤੂ ਜਾਂ ਸਾਰ ਦੱਸਣਾ। (ਅ) ਲੋਕ ਗੀਤਾਂ ਨਾਲ ਸੰਬੰਧਿਤ ਸੰਖੇਪ ਪ੍ਰਸ਼ਨ (ੲ) ਪ੍ਰਸੰਗ ਦੱਸਕੇ ਵਿਆਖਿਆ ਕਰਨੀ-</p> <p>Unit-II: ਵਿਹਾਰਕ ਪੰਜਾਬੀ- (ੳ) ਤਕਨੀਕੀ ਸ਼ਬਦਾਵਲੀ-ਨਿਰਧਾਰਤ 50 ਸ਼ਬਦ (ਅ) ਅਖਾਣਾਂ ਦੀ ਵਾਕਾਂ ਵਿਚ ਵਰਤੋਂ (ੲ) ਵਿਰੋਧਾਰਥਕ ਸ਼ਬਦ (ਸ) ਬਹੁਅਰਥਕ ਸ਼ਬਦ</p>
<b>Required Text</b>	ਪੰਜਾਬ ਦੇ ਲੋਕ ਗੀਤ, ਮਹਿੰਦਰ ਸਿੰਘ ਰੰਧਾਵਾ ਅਤੇ ਦੇਵਿੰਦਰ ਸਤਿਆਰਥੀ, ਸਾਹਿਤਯ ਅਕਾਦੇਮੀ, ਦਿੱਲੀ
<b>Suggested Text, readings and Materials</b>	ਲੋਕ ਸਭਿਆਚਾਰ, ਕ੍ਰਿਪਾਲ ਕਜ਼ਾਕ, ਚੇਤਨਾ ਪ੍ਰਕਾਸ਼ਨ, ਲੁਧਿਆਣਾ ਸਭਿਆਚਾਰ ਅਤੇ ਪੰਜਾਬੀ ਸਭਿਆਚਾਰ, ਗੁਰਬਖ਼ਸ਼ ਸਿੰਘ ਫਰੈਂਕ, ਪੰਜਾਬੀ ਰਾਈਟਰਜ਼ ਕੋਅ-ਸੁਸਾਇਟੀ, ਲੁਧਿਆਣਾ ਪੰਜ-ਆਬ, ਭੁਪਿੰਦਰ ਸਿੰਘ ਖਹਿਰਾ, ਪਬਲੀਕੇਸ਼ਨ ਬਿਊਰੋ, ਪੰਜਾਬ ਯੂਨੀਵਰਸਿਟੀ, ਚੰਡੀਗੜ੍ਹ
<b>Pedagogy for Course Delivery</b>	Lectures, discussions, Assignments
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title: HCP-2</b>	
<b>Course code: HCPCOMPL-2-201</b>	
<b>Course Outline</b>	The paper will equip the students with the basic understanding of History Culture of Punjab.
<b>Course Outcome</b>	1.To familiarize the students with history of Punjab under the colonial regime 2. To familiarize the students with national movements in Punjab.
<b>Course content/Syllabus</b>	As prescribed by Panjab University <b>UNIT I</b> Introduction of Colonial Rule in Punjab: Annexation of Punjab; Board of Administration; Western Education: Growth of Education and rise of middle classes; Agrarian Development: Socio Religious Reform: Movements: <b>UNIT II</b> Emergence Of Political Consciousness: Ghadar Movement; Jallianwala Bagh Massacre; Gurudwara Reform Movement; major Morchas; Activities of Babbar Akalis; HSRA and Bhagat Singh; Quit India Movement.
<b>Required Text</b>	1. Singh, Kirpal: History and Culture of the Punjab, Part II (Medieval Period), Publication Bureau, Punjabi University, Patiala 1990(3rd edn.).
<b>Suggested Text, readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Singh, Fauja(ed.): History of the Punjab, Vol.III, Punjabi University, Patiala 1972.</li> <li>2. Grewal, J.S.: The Sikhs of the Punjab, the New Cambridge History of India, Orient Longman, Hyderabad,1990.</li> <li>3. Singh, Khuswant: A History of the Sikhs, vol I: 1469-1839, oxford University Press, Delhi, 1991.</li> </ol>
<b>Pedagogy for Course Delivery</b>	Interactive theory sessions, assignment, self-study sessions.
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title: Introduction to Blockchain Technology</b> <b>Course code: CSA-VAC101/201/301/401</b>	
<b>Course Outline</b>	To enable the students to learn about Blockchain Technology.
<b>Course Outcome</b>	1. Understanding of what Blockchain is and why it is used. 2. Explanation of the different components involved within Blockchain, its application areas and Introduction of Cryptography
<b>Course Content/Syllabus</b>	As prescribed by Panjab University <b>UNIT-I</b> History of Blockchain, Terminologies in Blockchain, Types of Blockchain, Applications of Blockchain, how blockchain works, Ingredients of Blockchain. Various types of Blockchain and its real time applications. Introduction to cryptography-Encryption and Decryption, Ciphers <b>UNIT II</b> Introduction to Consensus Methods - Proof of Work (PoW), Proof of Stake (PoS), Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution system / social welfare systems. Block chain Cryptography: Privacy and Security on Block chain.
<b>Required Text</b>	Mark Gates, “Block chain: Ultimate guide to understanding block chain, bitcoin, crypto currencies, smart contracts and the future of money”, Wise Fox Publishing and Mark Gates 2017.
<b>Suggested Text, readings and Materials</b>	Bahga, Vijay Madiseti, “Block chain Applications: A Hands-On Approach”, ArshdeepBahga, Vijay Madiseti publishers 2017.
<b>Pedagogy for Course Delivery</b>	Interactive theory sessions, assignment, self-study sessions.
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<p align="center"><b>Course Title:</b> Introduction to Computer Hardware  <b>Course code:</b> CSA-VAC102/202/302/402</p>	
<b>Course Outline</b>	To enable the students to learn about hardware fundamentals.
<b>Course Outcome</b>	<ol style="list-style-type: none"> <li>1. Recognition of the fundamental hardware components that make up a computer's hardware.</li> <li>2. Introduction to the names and functions of hardware ports and the parts of the motherboard.</li> <li>3. Knowledge of Windows installation and Role of Anti-Virus.</li> </ol>
<b>Course Content/Syllabus</b>	<p align="center">As prescribed by Panjab University</p> <p align="center"><b>UNIT I</b></p> <p>Introduction to computer hardware: Definition, Peripheral devices of a Computer system, Add On cards: network interface card, sound card and graphics card, functional description of various parts of a PC, UPS, Types of UPS: offline, online and line interactive UPS Various Components of a PC: MotherBoard: Types of Motherboard AT, ATX, and BTX. Ports: Types of Ports, serial and parallel ports. Hard Disk: Types of Hard Disk: PATA, SATA, SCSI. RAM: Types of RAM: SRAM, DRAM, SDRAM, Power supply unit, cabinet, Processor.</p> <p align="center"><b>UNIT-II</b></p> <p>BIOS: Introduction, Connecting &amp; disconnecting computer peripherals and components, Mouse, Keyboard, Monitor, Hard Disk. Window installation, Hard disk: partitioning and formatting, creating, formatting and deleting partitions using DISKPART in Command Prompt and Graphical User Interface. Antivirus: features and Significance, Installing third party application. Firewall: Introduction to firewall, Features of firewall.</p>
<b>Required Text</b>	1. Govindarajalu, B., IBM-PC and Clones – Hardware Troubleshooting and Maintenance, Tata McGraw Hill, 2nd ed. N.D.
<b>Suggested Text, readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Basandra, S. K., Computers Today, Galgotia Publications</li> <li>2. Craig Zacker., The Complete Reference: PC Hardware, TMH Publication</li> </ol>
<b>Pedagogy for Course Delivery</b>	Interactive theory sessions, assignment, self-study sessions.
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<p style="text-align: center;"><b>Course Title: Digital Empowerment</b>  <b>Course code: CSA-VAC103/203/303/403</b></p>	
<b>Course Outline</b>	To develop understanding of the digital world, promote Digital India awareness, enable effective online communication and collaboration, and ensure cyber safety and security.
<b>Course Outcome</b>	By the end of this course, students should be able to: <ul style="list-style-type: none"> <li>• Use ICT and digital services in daily life.</li> <li>• Develop skills to communicate and collaborate in cyberspace using social platforms, and teaching/learning tools.</li> <li>• Understand the significance of security and privacy in the digital world.</li> </ul>
<b>Course Content/Syllabus</b>	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;"><b>Unit-1</b></p> <p><b>Digital Inclusion and Empowerment:</b> Needs and Challenges, Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, e-Kranti (Electronic Delivery of Services), and e-Health Campaigns.</p> <p><b>Communication and Collaboration in the Cyberspace:</b> Electronic mail, blogs, social media, Collaborative Digital platforms, Tools/platforms for online learning, Collaboration using file sharing, messaging, video conferencing.</p> <p style="text-align: center;"><b>Unit-II</b></p> <p><b>Towards Safe and Secure Cyberspace:</b> Online Security and Privacy, Threats in the Digital World: Data Breach and Cyber Attacks, Blockchain Technology, Security Initiatives by the Govt of India.</p> <p><b>Ethical Issues in the Digital World:</b> Netiquettes, Ethics in Digital Communication, Ethics in Cyberspace</p>
<b>Required Text</b>	<ol style="list-style-type: none"> <li>1. David Sutton. "Cyber security: A practitioner's guide", BCS Learning &amp; Development Limited, UK, 2017.</li> <li>2. Mahendra Pal Singh, V.N. Shukla's Constitution of India, (Eastern Book Company, Lucknow, 13th revised edn. 2017)</li> </ol>
<b>Suggested Text, readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Rodney Jones and Christoph Hafner. "Understanding digital literacies: A practical.</li> <li>2. Introduction". Routledge Books, 2nd edition, 2021.</li> </ol>
<b>Pedagogy for Course Delivery</b>	Interactive theory sessions, assignment, self-study sessions.
<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.

<b>Course Title: Ethics of Artificial Intelligence</b> <b>Course code: CSA-VAC104/204/304/404</b>	
<b>Course Outline</b>	<ul style="list-style-type: none"> <li>• To introduce students to the ethical considerations surrounding developing and deploying artificial intelligence technologies.</li> <li>• To provide an understanding of the role of ethics in AI and its implications for human life.</li> <li>• To explore various frameworks, models, and perspectives used to govern AI systems and ensure their alignment with human rights and ethical principles.</li> <li>• To analyze real-world cases and applications of AI ethics across different domains including transportation, military, healthcare, education, policy, and smart cities</li> </ul>
<b>Course Outcome</b>	<u>By the end of this course, students should be able to:</u> <ul style="list-style-type: none"> <li>• Define and explain the significance of ethics in the context of artificial intelligence.</li> <li>• Identify and evaluate ethical considerations inherent in the development and deployment of AI technologies.</li> <li>• Analyze the ethical implications of AI on accountability, transparency, and responsibility within computer systems.</li> </ul>
<b>Course Content/Syllabus</b>	<p style="text-align: center;">As prescribed by Panjab University</p> <p style="text-align: center;"><b>Unit-1</b></p> <p><b>Introduction:</b> Artificial Intelligence, Understanding Ethics, Introduction to AI Ethics, Role of AI in Human Life, Ethical Considerations of AI, Current Initiatives in AI and Ethics, Ethical Issues with our Relationship with Artificial Entities.</p> <p><b>Framework and Models:</b> AI Governance by Human-Right Centered Design, Normative Models, Role of Professional Norms, Teaching Machines to be Moral.</p> <p style="text-align: center;"><b>Unit-II</b></p> <p><b>Concepts and Issues:</b> Accountability in Computer Systems, Transparency, Responsibility and AI. Race and gender, AI as a Moral Right-holder.</p> <p><b>Perspectives and Approaches:</b> Perspectives on Ethics of AI, Integrating Ethical Values and Economic Value, Automating Origination, Machine Learning Values, Artificial Moral Agent.</p> <p><b>Application Ethics of AI:</b> Application Ethics of AI in Transport, Ethical AI in Military, Biomedical Research, Patient Care, Public Health, Robot Teaching, Pedagogy, Policy, and Smart City Ethics.</p>
<b>Required Text</b>	<ol style="list-style-type: none"> <li>1. S. Matthew Liao, “Ethics of Artificial Intelligence”, Oxford University Press Edited Book, 2020.</li> <li>2. Wallach, W., &amp; Allen, C, “Moral machines: Teaching robots right from wrong”, Oxford University Press, 2008.</li> </ol>
<b>Suggested Text, readings and Materials</b>	<ol style="list-style-type: none"> <li>1. Markus D. Dubber, Frank Pasquale, Sunit Das, “The Oxford Handbook of Ethics of AI”, Oxford University Press Edited book, 2020</li> <li>2. Paula Boddington, “Towards a Code of Ethics for Artificial Intelligence”, Springer, 2017</li> </ol>
<b>Pedagogy for Course Delivery</b>	Interactive theory sessions, assignment, self-study sessions.

<b>Evaluation Criteria</b>	5 marks will be internal assessment based on the Mid-Semester Test, Academic Activity (Activities and Assignments) and Attendance. 45 marks will be external assessment based on performance in examinations conducted by Panjab University.
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