DEPARTMENT OF COMPUTER SCIENCE, BELDA COLLEGE, BELDA 721424
PROGRAMME OUTCOME (PO), COURSE OUTCOME (CO) AND PROGRAMME SPECIFIC
OUTCOME (PSO) FOR END SEMESTER STUDENTS: UNDERGRADUATE COURSE

Programme Name: B.SC. HONS (COMPUTER SCIENCE) CBCS

PROGRAMME OUTCOMES(Session: 22-23)

PO	Summary	Description
PO1	Artificial Intelligence	Unlike the natural intelligence exhibited by animals, including humans, robots can exhibit artificial intelligence (AI), which is intelligence. A system that senses its environment and acts in a way that maximizes its chances of success is considered to be an intelligent agent, and this definition of AI research refers to systems that do just that.
PO2	Computer Graphics	Ability to draw pictures on computer screens with the help of programming. It involves computations, creation, and manipulation of data
PO3	Digital Image Processing	Ability to study the image fundamentals and mathematical transforms necessary for image processing. Ability to study image enhancement techniques. Ability to study image restoration procedures and image compression procedures.
PO4	Introduction to Data Science	Data Science makes it eligible to power the industries of today. Industries need data to improve their performance, make their business grow and provide better products to their customers. In the scenario of the data science section, we took an example of a commercial industry that wants to maximize its sales.
PO5	Mathematical Tool Designed to Solve Numerical Problems	A numerical method is a mathematical technique used in numerical analysis to address numerical issues. Numerical algorithms have the ability to create numerical methods with the proper convergence checks in computer languages. Ability to apply c language to numerical methods.
PO6	Systems Programming	Ability to develop the individual pieces of software that allow the entire system to function as a single unit.
PO7	Data Mining	Ability to analyze data by simplifying it and extracting the characteristics of its various components through the use of statistical algorithms that look for patterns in data.

PO8	Project Management	Ability to understand management and computing principles with computing knowledge to manage projects in multidisciplinary environments.
PO9	Communication Efficacy	Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
PO10	Individual & Team Work	Ability to work as a member or leader in diverse teams in a multidisciplinary environment.

PROGRAMME SPECIFIC OUTCOMES (PSO) :: BSC COMPUTER SC.

PSO1: Image processing is the manipulation of an image in order to enhance it or extract information from it. Image processing is widely used in medical visualization, biometrics, self-driving vehicles, gaming, surveillance, law enforcement, and other spheres. The main objective of AI is to familiarize students with all aspects of AI so that they can start their career with knowledge of artificial intelligence. A few of the many topics/modules that they will learn in the programme are: basics of deep learning techniques, understanding artificial neural networks, training a neural network using training data, and so many more. Knowledge about digital image processing and the role of AI.

PSO2: Ability to Manipulate and store different types of images and objects. Ability to design, develop, and create videos and computer programs, science modeling, catalog design, and other commercial art.

PSO 3: Knowledge about data science makes data better. Companies require skilled data scientists to process and analyze their data. The student not only analyzes the data but also improves its quality for the data mining course. The data science course deals with enriching data and making it better for their company.

PSO 4: Numerical analysis has the ability to use numerical methods with C or other programming languages. When computer languages have the appropriate convergence criteria, numerical algorithms can produce numerical methods.

PSO 5: The goal of learning system programming is to achieve efficient use of available resources, either because the software itself is performance-critical or because even small efficiency improvements directly transform into significant savings of time or money. In systems programming, often limited programming facilities are available.

PSO 6: The use of data mining techniques is widespread, with applications in industry, science, and government. Businesses examine recorded data, including user preferences, sales figures, and historical inventory levels, using data mining. They can make wiser decisions if they can spot trends and recurring patterns in this data.

PSO 7: Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PSO 8: Student will be able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems.

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Course Outcomes (CO) for End Semester Students:

CO 6.1: (Paper CC13 and DSE 3-ARTIFICIAL INTELLIGENCE and IMAGE PROCESSING)

To get a thorough idea about artificial intelligence (AI). Describe artificial intelligence as an idea. To get a complete overview of how to use AI in different problem solving. Get knowledge about the use of prolog programs to implement AI algorithms. This course helps to understand natural language. To get ideas for implementing intelligent systems, choose wisely from a variety of strategies..

Solve simple AI-based issues by programming languages. Apply AI methods to practical issues to create intelligent systems. To use a prolog program in AI. Develop programming solutions for given problem scenarios.

To understand digital image processing and the role of AI in it. To get an idea of some AI-based image processing tools and techniques that may be used for developing intelligent applications. Use the most popular neural network models used for different image processing tasks. Get knowledge about Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching.

CO 6.2: (Paper CC14 - Computer Graphics)

Be familiar with the fundamentals of computer graphics as well as the various graphics systems and applications. Talk about various algorithms for basic object filling and scan conversion, along with a comparison of them. The application of geometric changes to pictorial items in composite form. Extract the scene using various clipping techniques and convert it for display on a graphics device. Examine visible surface detection methods and projections for the display of 3D scenes on 2D screens. To write a few programs for geometric transformation of images.

CO 6.3: (Introduction to Data Science)

To develop R programming solutions for given problem scenarios. In this course, students will learn how to program in R and how to use R effectively. Get the concepts and tools behind reporting modern data analyzes in a reproducible manner. To write a document using R markdown, integrate live R code into a literate statistical program.

CO 6.4: (Numerical Methods)

To show that you understand how to get approximations of solutions to mathematical problems that might otherwise be insurmountable. To acquire approximations of solutions to mathematical problems, use numerical approaches.   For a variety of mathematical processes and activities, including interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations, derive numerical methods. Analyze and assess the precision of standard numerical techniques. Use a C program to implement numerical techniques.   Produce effective, well-documented Matlab code, and convey numerical findings in a way that is instructive.

CO 6.5: (Systems Programming)

To comprehend various system software elements and intermediate code generation within the framework of language design.

To detect operating system capabilities related to run-time storage management, such as memory management.

CO 6.6: (Data Mining)

To fully understand standard data mining methods and techniques such as association rules, data clustering, and classification. Learn new, advanced techniques for emerging applications (e.g. social network analysis, stream data mining).

To gain practical intuition about how to apply these techniques to datasets of realistic sizes using modern data analysis frameworks using R programming.

CO 6.7: (Project Management)

To help the students comprehend the fundamentals of project management for the purpose of project planning and execution.

To aid in their comprehension of methods for cost and time estimation in project management feasibility analysis.

To enable them to comprehend the fundamentals of data-driven or research-based design projects.

Develop their ability to evaluate, utilize, and appreciate modern project management technologies and processes.

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OUTLINE SYLLABUS OF END SEMESTER UG (HONOURS) COURSES DEPARTMENT OF COMPUTER SCIENCE

List of Core Course (CC)

CC 13: Artificial Intelligence (Credits 06)

CC 13T (Credits 04)

Unit-1. Introduction

 Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

Unit-2. Problem Solving and Searching Techniques

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

Unit-3. Knowledge Representation

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

Unit-4. Dealing with Uncertainty and Inconsistencies

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

Unit-5. Understanding Natural Languages

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

CC 13P (Credits 02)

Write a prolog program to calculate the sum of two numbers.

Write a prolog program to find the maximum of two numbers.

Write a prolog program to calculate the factorial of a given number.

Write a prolog program to calculate the nth Fibonacci number.

Write a few prolog prolog programs.

CC 14: Computer Graphics (**Credits 06**)

CC 14T (Credits 04)

Course Contents:

Unit-1. Introduction

Basic elements of Computer graphics, Applications of Computer Graphics.

Unit-2. Graphics Hardware

Architecture of Raster and Random scan display devices, input/output devices.

Unit-3. Fundamental Techniques in Graphics

Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

Unit-4. Geometric Modeling

Representing curves & Surfaces.

Unit-5. Visible Surface determination

Hidden surface elimination.

Unit-6. Surface rendering

Illumination and shading models. Basic color models and Computer Animation.

CC 14P (Credits 02)

List of Practical:

1. **Write a program to implement Bresenham's line drawing algorithm.**

2. **Write a program to implement midpoint circle drawing algorithm.**

3. **Write a program to clip a line using Cohen and Sutherland line clipping algorithm.**

4. **Write a program to clip a polygon using Sutherland Hodgeman algorithm.**

5. **Write a program to apply various 2D transformations on a 2D object (use homogenous coordinates).**

6. **Write a program to apply various 3D transformations on a 3D object and then apply parallel and perspective projection on it.**

7. **Write a program to draw Hermite/Bezier curve.**

List of Discipline Specific Electives (DSE)

DSE 3:

Digital Image Processing

Or

Introduction to Data Science

Or

Numerical Methods

DSE 4:

Systems Programming

Or

Data Mining

Or

Dissertation / Project work

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MAPPING OF CO, PO, PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO 1	√		√								√							
CO 2		√										√						
CO 3				√									√					
CO 4					√									√				
CO 5						√									√			
CO 6							√									√		
CO 7								√	√	√							√	√

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JUSTIFICATION MATRIX OF CO WITH PO & PSO (High: 3, Medium: 2, Low: 1)

Course	Mapping	Correlation	Justification
CO1	PO1	HIGH	Students acquired sufficient knowledge about AI
	PO3	HIGH	Students acquired sufficient knowledge about Image Processing
	PSO1	HIGH	Students acquired sufficient knowledge about AI and Image Processing; and get knowledge about solving image handling by different AI based problem.
CO2	PO2	HIGH	Students acquired sufficient knowledge about Computer Graphics
	PSO2	HIGH	Students are getting knowledge about programs for graphics implements.

CO3	PO4	HIGH	Students have enough knowledge about data science.
	PSO3	HIGH	Students have grown used to data science.
CO4	PO5	HIGH	The students are able to solve the numerical problems. Use C program to implement numerical techniques.
	PSO4	HIGH	Students are able to solve numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
CO5	PO6	HIGH	Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.. Student Analyze important algorithms, e.g., process scheduling and memory management algorithms.

	PSO5	HIGH	Recognize the basic operating system abstractions, including shared memory areas, processes, threads, files, semaphores, and IPC abstractions. Students examine significant algorithms, including as memory management and process scheduling algorithms.
CO6	PO7	HIGH	After completing this course, the student should be able to understand what data mining is and what kinds of data can be mined.
	PSO6	HIGH	By this course, the student should be able to understand what data mining is and what kinds of data can be mined.
CO7	PO8	HIGH	On successful completion of the course, students will be able to demonstrate sound technical knowledge of their selected project topic and undertake problem identification, formulation, and solution by utilizing computer software or hardware-based programming.

	PO9	HIGH	Gain ability to present communication efficiency.
	PO10	HIGH	Ability to work as a member or leader in diverse teams in a multidisciplinary environment.
	PSO7	MEDIUM	Apply standard software engineering practices and strategies in software project development.
	PSO8	MEDIUM	Student will be able to know various issues, latest trends in technology development

ARTICULATION MATRIX OF CO WITH PO & PSO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO 1	3		3								3							
CO 2		3										3						
CO 3				3									3					
CO 4					3									3				
CO 5						3									3			
CO 6							3									3		
CO 7								3	3	3							2	2
TARGET	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	2

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CO ATTAINMENT

DIRECT METHOD

Academic Session: 2022-2023 Semester VI

Programme Name: B. SC. Hons (Bachelor of Science in Computer Science)

ATTAINMENT LEVELS FOR

Target Level	Level Description Marks student scoring	50 → indicates % and above in the questions in Internal and External tests
1	**Below 40%**	
2	**40% - 49%**	
3	**50% & above**	

Sl No.	Student's Name	Th Marks (CA+IA+WR)	Pr Marks	Th Marks(CA+IA+WR)	Pr Marks	Th Marks(CA+IA+WR)	Pr Marks	Th Marks(CA+IA+WR)	Pr Marks
	Total marks	55	20	55	20	55	20	55	20
	CO nos.	CO 6.1-CC 13: ARTIFICIAL INTELLIGENCE	CO 6.1- CC 13: ARTIFICIAL INTELLIGENCE	CO 6.2-CC14 Computer Graphics	CO 6.2-CC 14: Computer Graphics	CO 6.2-DSE3: System Programming	CO 6.2-DSE3: System Programming	CO 6.4-DSE-4: Dissertation / Project work	CO 6.4-DSE-4: Dissertation / Project work
1	AYAN PATRA	42	20	44	19	35	20	65	

2	SUB HADI P DEY	33	19	40	17	24	19	60
3	RAH UL MAN NA	25	19	33	17	28	19	60
4	SUB HAM PRA DHA N	29	19	34	17	28	20	60
Number of students obtained more than 50%	4	4	4	4	4	4	4
Attainment level in %	100%	100%	100%	100%	100%	100%	100%

Target Level	3	3	3	3	3	3	3