Practical Plan

B.E. (CE- Section A) (Semester VI)

Subject: Artificial Intelligence*(Practical)*

Teacher-in-charge: Dr. B. S. Daga

Subject code: CSL604

Academic Term: January– April 2023

Course Outcomes:

Upon completion of this course students will be able to:

CSL604.1 Identify languages and technologies for Artificial Intelligence

CSL604.2 Understand and implement uninformed and informed searching techniques for real world problems

CSL604.3 Create a knowledge base using any AI language

CSL604.4 Design and implement expert systems for real world problems

Relationship of course outcomes with program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSL604.1		1			1								1	
CSL604.2			1										1	
CSL604.3													1	
CSL604.4			1										1	

Justification of PO to CO mapping

CO	Competency	Performance Index
CSL604.1	2.1 Demonstrate an ability to identify and formulate complex engineering problem	2.1.1 Articulate problem statements and identify objectives 2.1.2 Identify processes/modules of a computer-based system and parameters to solve a problem 2.1.3 Identify an algorithm that applies to a given problem

	2.2 Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1 Reframe the computer-based system into interconnected subsystems 2.2.2 Identify functionalities and computing resources. 2.2.3 Identify existing solution/methods to solve the problem, including forming justified approximations and assumptions. 2.2.4 Compare and contrast alternative solution/methods to select the best methods 2.2.5 Compare and contrast alternative solution processes to select the best process.
	2.3 Demonstrate an ability to formulate and interpret a model	2.3.1 Able to apply computer engineering principles to formulate modules of a system with required applicability and performance. 2.3.2 Identify design constraints for required performance criteria.
	2.4 Demonstrate an ability to execute a solution process and analyze results	2.4.1 Applies engineering mathematics to implement the solution. 2.4.2 Analyze and interpret the results using contemporary tools. 2.4.3 Identify the limitations of the solution and sources/causes. 2.4.4 Arrive at conclusions with respect to the objectives.
	5.1 Demonstrate an ability to identify/create modern engineering tools, techniques and resources	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities 5.1.2 Create/adapt/modify/extend tools and techniques to solve engineering problems
	5.2 Demonstrate an ability to select and apply discipline-specific tools, techniques and resources	5.2.1 Identify the strengths and limitations of tools for (i) acquiring information, (ii) modelling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs. 5.2.2 Demonstrate proficiency in using discipline-specific tools

	5.3 Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.3.1 Discuss limitations and validate tools, techniques and resources 5.3.2 Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
	1.1 Demonstrate competence in mathematical modelling, and engineering fundamentals.	1.1.1 Develop mathematical concepts required for ML and AI algorithms. 1.1.2 Devise the concepts of modelling for the said systems. 1.1.3 Apply theory and principles of Computer Science and engineering.
	1.2 Demonstrate an ability to identify the applicability of AI and ML solutions to a problem.	1.2.1 Articulate problem statements and identify objectives 1.2.2 Analyze the problem for applicability of AI and ML solutions. Identify an algorithm that applies to a given problem
	1.3 Demonstrate an ability to identify solutions/methods to solve the problem.	1.3.1 Identify processes/modules of anArtificial Intelligence and Machine Learning system and parameters to solve a problem 1.3.2 Apply various methods and evaluate their performance. 1.3.3 Choose an appropriate method for the given problem
	1.4 Demonstrate an ability to execute the solution.	1.4.1 Use the chosen method to implement the solution. 1.4.2 Analyse and interpret the results using contemporary tools. 1.4.3 Identify the limitations of the solution and sources/causes.
CSL604.2	3.1 Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.1.1 Able to define a precise problem statement with objectives and scope. 3.1.2 Able to identify and document system requirements from stake-holders. 3.1.3 Able to review state-of-the-art literature to synthesize system requirements

	3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Able to explore design alternatives. 3.2.2 Able to produce a variety of potential design solutions suited to meet functional requirements. 3.2.3 Identify suitable criteria for evaluation of alternate design solutions.
	3.3 Demonstrate an ability to select optimal design scheme for further development	3.3.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria. 3.3.2 Consult with domain experts and stakeholders to select candidate engineering design solution for further development
	3.4 Demonstrate an ability to advance an engineering design to defined end state	3.4.1 Able to refine architecture design into a detailed design within the existing constraints. 3.4.2 Able to implement and integrate the modules. 3.4.3 Able to verify the functionalities and validate the design.
	1.1 Demonstrate competence in mathematical modelling, and engineering fundamentals.	1.1.1 Develop mathematical concepts required for ML and AI algorithms. 1.1.2 Devise the concepts of modelling for the said systems. 1.1.3 Apply theory and principles of Computer Science and engineering.
	1.2 Demonstrate an ability to identify the applicability of AI and ML solutions to a problem.	1.2.1 Articulate problem statements and identify objectives 1.2.2 Analyze the problem for applicability of AI and ML solutions. Identify an algorithm that applies to a given problem

	1.3 Demonstrate an ability to identify solutions/methods to solve the problem.	1.3.1 Identify processes/modules of anArtificial Intelligence and Machine Learning system and parameters to solve a problem 1.3.2 Apply various methods and evaluate their performance. 1.3.3 Choose an appropriate method for the given problem	
	1.4 Demonstrate an ability to execute the solution.	1.4.1 Use the chosen method to implement the solution. 1.4.2 Analyse and interpret the results using contemporary tools. 1.4.3 Identify the limitations of the solution and sources/causes.	
CSL604.3	1.1 Demonstrate competence in mathematical modelling, and engineering fundamentals.	1.1.1 Develop mathematical concepts required for ML and AI algorithms. 1.1.2 Devise the concepts of modelling for the said systems. 1.1.3 Apply theory and principles of Computer Science and engineering.	
	1.2Demonstrate an ability to identify the applicability of AI and ML solutions to a problem.	1.2.1 Articulate problem statements and identify objectives 1.2.2 Analyze the problem for applicability of AI and ML solutions. Identify an algorithm that applies to a given problem	
	1.3 Demonstrate an ability to identify solutions/methods to solve the problem.	1.3.1 Identify processes/modules of anArtificial Intelligence and Machine Learning system and parameters to solve a problem 1.3.2 Apply various methods and evaluate their performance. 1.3.3 Choose an appropriate method for the given problem	
	1.4 Demonstrate an ability to execute the solution.	1.4.1 Use the chosen method to implement the solution. 1.4.2 Analyse and interpret the results using contemporary tools. 1.4.3 Identify the limitations of the solution and sources/causes.	

CSL604.4	3.1 Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.1.1 Able to define a precise problem statement with objectives and scope.
		3.1.2 Able to identify and document system requirements from stake-holders.
		3.1.3 Able to review state-of-the-art literature to synthesize system requirements.
		3.1.4 Able to choose appropriate quality attributes as defined by ISO/IEC/IEEE standard.
		3.1.5 Explore and synthesize system requirements from larger social and professional concerns.
		3.1.6 Able to develop software
	3.2 Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1 Able to explore design alternatives.
		3.2.2 Able to produce a variety of potential design solutions suited to meet functional requirements.
		3.2.3 Identify suitable criteria for evaluation of alternate design solutions.
	3.3 Demonstrate an ability to select optimal design scheme for further development	3.3.1 Able to perform systematic evaluation of the degree to which several design concepts meet the criteria.
		3.3.2 Consult with domain experts and stakeholders to select candidate engineering design solution for further development
	3.4 Demonstrate an ability to advance an engineering design to defined end state	3.4.1 Able to refine architecture design into a detailed design within the existing constraints.
		3.4.2 Able to implement and integrate the modules.
		3.4.3 Able to verify the functionalities and validate the design.
	1.1 Demonstrate competence in mathematical modelling, and engineering fundamentals.	1.1.1 Develop mathematical concepts required for ML and AI algorithms.
		1.1.2 Devise the concepts of modelling for the said systems.
		1.1.3 Apply theory and principles of Computer Science and engineering.

	1.2Demonstrate an ability to identify the applicability of AI and ML solutions to a problem.	1.2.1 Articulate problem statements and identify objectives
		1.2.2 Analyze the problem for applicability of AI and ML solutions.
		Identify an algorithm that applies to a given problem
	1.3 Demonstrate an ability to identify solutions/methods to solve the problem.	1.3.1 Identify processes/modules of anArtificial Intelligence and Machine Learning system and parameters to solve a problem
		1.3.2 Apply various methods and evaluate their performance.
		1.3.3 Choose an appropriate method for the given problem
	1.4 Demonstrate an ability to execute the solution.	1.4.1 Use the chosen method to implement the solution.
		1.4.2 Analyse and interpret the results using contemporary tools.
		1.4.3 Identify the limitations of the solution and sources/causes.

CO Assessment Tools:

Course Outcomes	Direct Method (80%)				Indirect Method (20%)
	Attendance	Lab Performance	Journal Assessment	End Sem Exam (PR)	Course exit survey
CSL604.1	10%	20%	20%	50%	100%
CSL604.2	10%	20%	20%	50%	100%
CSL604.3	10%	20%	20%	50%	100%
CSL604.4	10%	20%	20%	50%	100%

CO calculation= (0.8 *Direct method + 0.2*Indirect method)

Rubrics for assessing Course Outcome with each assessment tool:

Laboratory:

Sr. No	Performance Indicator	Exceed Expectation (EE)	Meet Expectation (ME)	Below Expectation (BE)
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)
2	Logic/Algorithm Complexity analysis(03)	03(Correct)	02(Partial)	01 (Tried)
3	Coding Standards (03): Comments/indention/Naming conventions Output/Test Cases	03(All used)	02 (Partial)	01 (rarely followed)
4	Post Lab Assignment (03)	03(done well)	2 (Partially Correct)	1(submitted)

Practical Session Plan

CLASS	**BEComputer Engineering, Semester VII**
Academic Term	**Jan – April 2023**
Subject	**Artificial Intelligence (CSL604)**

Evaluation System		*Hours*	*Marks*
	Practical Examination	--	--
	Oral Examination	--	25
	Term work	--	25
	Total	--	50

Time Table	*Day*	*Batch*	*Time*
	Monday	*D*	*11.15am-1.15pm*
	Monday	*A*	*02.45- 4.45pm*
	Tuesday	*C*	*11.15am-1.15 pm*
	Friday	*B*	*11.15am-1.15 pm*

Title of Experiments

Sr.	*Title*	*Attained COs*
1	Tic Tac Toe implementation using AI approach	CSL604.3
2	Water Jug problem based on states space approach	CSL604.2
3	Missionaries and Cannibals on production system approach	CSL604.1
4	N Queen problem solving by using back tracking	CSL604.1
5	Eight puzzle by A* algorithm	CSL604.2
6	Tower of Hanoi	CSL604.2
7	ID3 decision tree based classification method	CSL604.4
8	Prolog programs to understand knowledge representation	CSL604.2
9	Expert System simple prototype	CSL604.4
10	Travelling salesman problem using	CSL604.2

Newly added experiments	
1	All experiments are new

Practical Session Plan

Batch	*Dates*		*Remarks*
	Planned	*Actual*	
Experiment No. 1 – Tic Tac Toe implementation using AI approach			
A	23/01/2023		
B	2701/2023		
C	24/01/2023		
D	23/01/2023		

Experiment No. 2 Water Jug problem based on states space approach			
A	30/01/2023		
B	03/02/2023		
C	31/01/2023		
D	30/01/2023		
Experiment No. 3 Missionaries and Cannibals on production system approach			
A	06/02/2023		
B	10/02/2023		
C	07/02/2023		
D	06/02/2023		
Experiment No. 4 N Queen problem solving by using back tracking			
A	13/02/2023		
B	17/02/2023		
C	14/02/2023		
D	13/02/2023		
Experiment No.5 Eight puzzle by A* algorithm			
A	20/02/2023		
B	17/02/2023		
C	21/02/2023		
D	20/02/2023		
Experiment No. 6 Tower of Hanoi			
A	27/01/23		
B	03/03		
C	28/02		
D	27/01		
Experiment No. 7 ID3 decision tree based classification method			
A	06/03/23		
B	10/03		
C	07/03		
D	06/03		
Experiment No. 8 Prolog programs to understand knowledge representation			
A	13/03/23		
B	17/03		
C	14/03		
D	13/03		

Experiment No. 9 Expert System simple prototype			
A	20/03/23		
B	24/03		
C	21/03		
D	20/03		
Experiment No. 10 Travelling salesman problem using i. Heuristic function ii. Bidirectional			
A	27/03		
B	31/03		
C	28/03		
D	27/03		

Submitted By	Approved By
Dr. B. S. Daga	Dr. Sujata Deshmukh (HOD)
Date of Submission:	**Date of Approval:**
Remarks by DQAC (if any)	