Indra Ganesan
COLLEGE OF ENGINEERING

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'B+' Grade, 2(f) & 12B Status Institution by UGC
IG Valley, Madurai Main Road, Manikandam, Tiruchirappalli - 620012

NAAC DOCUMENTS

QUALITY INDICATOR FRAME WORK

CRITERION – 1

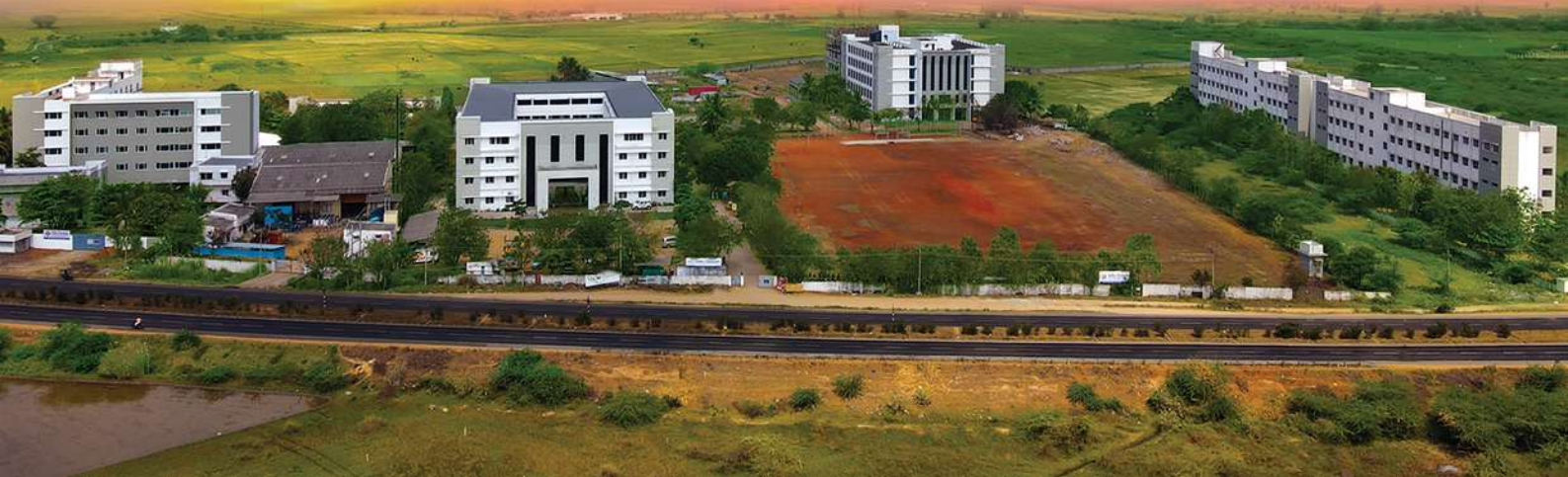
CURRICULAR ASPECTS

SUBMITTED BY

IQAC

INTERNAL QUALITY ASSURANCE CELL

INDRA GANESAN COLLEGE OF ENGINEERING



Criteria 1	Curricular Aspects	100

1.1 Curricular Planning and Implementation (20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Table of Content

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PREFACE OF THE COURSE FILE

Batch : 2018-2022

Academic Year : **2020-2021 / EVEN**

Program : **COMPUTER SCIENCE AND ENGINEERING**

Year & Semester : **3nd Year / 6th Semester / 'B' Section**

Course Code :**CS8691** NBA Course Code: **C311**

Name of the Course : **ARTIFICIAL INTELLIGENCE**

Faculty in-charge : J.JENIFER

Signature of the Faculty in-charge

HoD / CSE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REVIEW OF COURSE FILE

(to be pasted on the inner side of the file-backside).(#-State Yes/No.)

S.N	Details Date:	R-I-*	R-II-*&	R-III-*&	R-IV-*&$	R-V-*&$@
1.	Preface of the course file	Y				
2.	Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy	Y				
3.	Subject handlers of yesteryears	Y				
4.	Timetable/Workload of the staff – Distribution of teaching load – Roles and Responsibilities	Y				
5.	Syllabus signed by staff & HoD	Y				
6.	Lecture Schedule signed by staff & HoD	Y				
7.	Course Committee meeting circular and minutes	Y				
8.	Identification of Curricular gap and Content Beyond the syllabus	Y				
9.	Self-study topics	Y				
10.	Previous AU Question papers	Y				
11.	Unit wise Q&A and Objective type questions	Y				
12.	Unit wise course material	Y				
13.	Assignment question paper with sample answer sheets and mark entry	Y				
14.	Tutorial question paper with key and mark entry		Y	Y		
15.	Class test/IA test Q Paper with Key, sample answer papers and mark entry		Y	Y		
16.	IA Test- result analysis-CAP-evidence-root cause analysis.		Y	Y		
17.	Retest –Q paper-Attendance-marks		Y	Y		
18.	AU Web portal entry sheet		Y	Y		
19.	Very poor performance in first two tests-action taken.-communication to parents-evidence		Y	Y		
20.	Absence for two tests-action taken-communication to parents-evidence.		Y	Y	Y	
21.	Indiscipline of student reported, if any		Y	Y	Y	
22.	Special class/coaching class/remedial class/attendance-CAP		Y	Y	Y	
23.	Conduct of Seminar, Quizzes - proof		Y	Y	Y	
24.	Content beyond the syllabus - proof		Y	Y	Y	
25.	Student feedback on faculty				Y	
26.	Course end survey				Y	
27.	Internal Assessment sheet				Y	
28.	AU question paper with students feedback				Y	
29.	Discrepancy of the question paper and correspondence, if any					
30.	AU result analysis-Details of arrear students.		Y	Y	Y	
31.	AU grade sheet		Y	Y	Y	
32.	CO – PO & PSO attainment sheet			Y	Y	
	Signature of Course handling faculty					
	Signature of HoD	D.Leda	D.Leda	D.Leda	D.Leda	

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Faculty Time Table

J.JENIFER A.P/CSE

Day Order	1	2	3	4	5	6	7	8
I			AI					
II		AI						
III				AI				
IV		AI						
V				AI				

S.Code	Title	Year / Branch	Hours
CS8691	ARTIFICIAL INTELLIGENCE	III / CSE	5
TOTAL - 5 hours			

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Signature of the Faculty in-charge

HoD / CSE

CS8691 **ARTIFICIAL INTELLIGENCE** L T P C 3 0 0 3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

UNIT I INTRODUCTION 9

Introduction–Definition – Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II PROBLEM SOLVING METHODS 9

Problem solving Methods – Search Strategies- Uninformed – Informed – Heuristics – Local Search Algorithms and Optimization Problems – Searching with Partial Observations – Constraint Satisfaction Problems – Constraint Propagation – Backtracking Search – Game Playing – Optimal Decisions in Games – Alpha – Beta Pruning – Stochastic Games

UNIT III KNOWLEDGE REPRESENTATION 9

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation – Ontological Engineering-Categories and Objects – Events – Mental Events and Mental Objects – Reasoning Systems for Categories – Reasoning with Default Information

UNIT IV SOFTWARE AGENTS 9

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS 9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing – Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

TOTAL :45 PERIODS

OUTCOMES: Upon completion of the course, the students will be able to:

- Use appropriate search algorithms for any AI problem
- Represent a problem using first order and predicate logic
- Provide the apt agent strategy to solve a given problem
- Design software agents to solve a problem
- Design applications for NLP that use Artificial Intelligence.

TEXT BOOKS:

S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach‖, Prentice Hall, Third Edition, 2009.

I.Bratko, —Prolog: Programming for Artificial Intelligence‖, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, —Artificial Intelligence: A Systems Approach(Computer Science)‖, Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, —The Quest for Artificial Intelligence‖, Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish,‖ Programming in Prolog: Using the ISO Standard‖, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, —Multi Agent Systems‖, Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, —Artificial Intelligence: Foundations of Computational Agents‖, Cambridge University Press, 2010

Signature of the Faculty

HOD/CSE

Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERINT

Lecture Schedule

Degree/Program: **B.E / CSE**
Duration: **2020 -2021**

Course code &Name: **CS8691 ARTIFICIAL INTELLIGENCE**
Semester: **VI** Section: **A** Faculty : J.JENIFER

AIM:

To create systems that can perform tasks that typically require human intelligence, such as recognizing images.

OBJECTIVES:

To impart knowledge on

(i) Explain the basic knowledge representation,problem solving,and learning methods of Artificial Intelligence

(ii) Assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving particular particular engineering problems

(iii) Develop intelligent systems by assembling solutions to concrete computational problems

(iv) Understand the role of knowledge representation, problem solving, and learning in intelligent-system engineering

(v) Develop an interest in the field sufficient to take more advanced subjects

PREREQUISITES: Python, Java ,C++.

COURSE OUTCOMES:

After the course, the student should be able to:

CO	Course Outcomes	POs	PSOs
C311.1	Explain autonomous agents that make effective decisions in fully informed, partially observable, and adversarial settings.	1,2,3,4	1,2
C311.2	Choose appropriate algorithms for solving given AI problems	1,2,3,4	1,2
C311.3	Design and implement logical reasoning agents	1,2,3,4	1,2
C311.4	Design and implement agents that can reason under uncertainty	1,2,3,4	1,2
C311.5	Implement simple PEAS descriptions for given AI tasks	1,2,3,4	1,2
C311.6	Develop programs to implement simulated annealing and genetic algorithms	1,2,3,4	1,2

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

S.No	Date	Period	Topics to be Covered	Book & Page. No.
UNIT I INTRODUCTION				**Target periods :05**
1	1.2.21	3	Introduction–Definition	R1
2	2.2.21	2	Future of Artificial Intelligence	R1
3	3.2.21	4	Characteristics of Intelligent Agents	R1
4	4.2.21	2	Typical Intelligent Agents	R1
5	5.2.21	4	Problem Solving Approach to Typical AI problems	
UNIT II ENCRYPTION TECHNIQUES AND KEY MANAGEMENT Target periods :08				
6	8.2.21	3	Problem solving Methods — Search Strategies	R2
7	9.2.21	2	Uninformed — Informed	R2
8	10.2.21	4	Heuristics — Local Search Algorithms and Optimization Problems	R2
9	11.2.21	2	Searching with Partial Observations — Constraint Satisfaction Problems	R2
10	12.2.21	4	Constraint Propagation	
11	15.2.21	3	Backtracking Search — Game Playing	R2
12	17.2.21	2	Optimal Decisions in Games	R2
13	18.2.21	4	Alpha — Beta Pruning — Stochastic Games	R2
UNIT III AUTHENTICATION, INTEGRITY AND ACCESS CONTROL Target Periods :08				
14	19.2.21	2	First Order Predicate Logic — Prolog Programming	R3
15	22.2.21	4	Unification — Forward Chaining-Backward Chaining	
16	23.2.21	3	Resolution — Knowledge Representation	R3
17	24.2.21	2	Ontological Engineering-Categories and Objects	R3
18	25.2.21	4	Events — Mental Events and Mental Objects	R3
19	26.2.21	2	Reasoning Systems for Categories	R3
20	1.3.21	4	Reasoning with Default Information	R3
UNIT IV SECURITY Target Periods :12				
21	2.3.21	3	Architecture for Intelligent Agents	
22	3.3.21	2	Agent communication	R3
23	4.3.21	4	Negotiation and Bargaining	R3
24	5.3.21	2	Argumentation among Agents	
25	8.3.21	4	Trust and Reputation in Multi-agent systems.	R3
26	9.3.21	2	Events — Mental Events and Mental Objects	
27	10.3.21	2	Moving	R3
UNIT V SECURITY APPLICATIONS Target Periods:12				
28	11.3.21	4	AI applications	R4
29	12.3.21	2	Language Models	R4
30	15.3.21	4	Information Retrieval	R4
31	16.3.21	3	Information Extraction	R4
32	17.3.21	2	Natural Language Processing	R4
33	18.3.21	4	Machine Translation	R4
34	19.3.21	2	Speech Recognition	R4
35	22.3.21	4	Robot	R4
36	23.3.21	3	Hardware	R4
37	24.3.21	2	Perception	R4
38	25.3.21	4	Planning	R4
Content Beyond the Syllabus				
46	28.3.21	4	Machine Learning is a superset of Deep Learning	Material

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Book Reference – References

Sl	Title of the Book	Author	Publisher	Year
1.	"Cryptography and Network Security Principles and Practice",	William Stallings	Pearson Education International	**2011**
2.	"Computer Security Principles and Practice"	William Stallings and Lawrie Brown	Pearson Education International	2015
3	"IoT Security: Challenges, Solutions & Future Prospects",	Mikhail Gloukhovtsev	Dell Inc	2018,
4	Privacy and Security Issues in Big Data, An Analytical View on Business Intelligence	Pradip KumarDas, Hrudaya Kumar Tripathy	Springer	2021.

Website Refere ce:

https://en.wikipedia.org/wiki/Artificial_intelligence

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Signature of the Faculty in-charge

HoD / CSE

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty :J.JENIFER **Course Code & Name: CS8691-ARTIFICIAL INTELLIGENCE**

Degree & Program:B.E. /CSE **Semester & Section: VI / A** **Academic Year: 2020 -2021 /EVEN**

I.Mapping of Course Outcomes with POs & PSOs.(before CBS)

Table.1 Mapping of COs, C, PSOs with POs - before CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C311.1	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.2	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.3	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.4	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.5	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.6	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C212	3	2	1	1	-	-	-	-	-	2	1	1	2	2

II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Machine Learning is an evolution of AI	PO5(2) Vacant filled	C311.5 & C311.6/ IV & V

III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

Table.3 Mapping of COs, C, PSOs with POs- after CBS.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C311.1	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.2	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.3	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.4	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.5	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311.6	3	2	1	1	-	-	-	-	-	2	1	1	2	2
C311	3	2	1	1	-	-	-	-	-	2	1	1	2	2

Signature of the Faculty

HoD/CSE

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620012, India
(Approved by AICTE, New Delhi, Affiliated toAnnaUniversity,Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CBS-PROOF

ACADEMICYEAR: 2020-2021(EVEN) **SEM: 06** **REGULATION: 2021**

PROGRAM: B.E CSE **Name of the Faculty: Ms. J. Jenifer AP/CSE**

TOPIC: MACHINE LEARNING IN SUPERSET OF DEEPLEARNING

Signature of the Faculty Incharge

Hod/CSE

Dr. G. Balakrishnan, M.E., Ph.D.
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Assignment Question Paper

Assignment – 01			Date of Issue:	04.10.2020	Marks	10
Course code	CS8691	Course Title	ARIFICIAL INTELLIGENCE			
Year	III	Semester/Section	VI / A	Date of Submission:	11.10.2020	

Q.No	Questions	CO
1	Differentiate between natural intelligence and artificial intelligence.	C311.1
2	Explain the task clarification of AI	C311.1

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Name and Signature of the Faculty Incharge

HoD/CSE

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India
(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Assignment Answer Sheet

Name of the Student:

AU Register Number:

Assignment – 01			Date of Issue:	04.02.2021	Marks	10
Course code	CS8691	Course Title	Artificial Intelligence			
Year	2021	Semester/Section	IV / VI	Date of Submission:	10.02.21	

Q.No	Questions	CO
1	Differentiate between natual Intelligence & artificial	C311.1
2	Explain the task classification of AI	C311.1

Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	5
Presentation Quality	2	2
Timely submission	2	2
Total marks	10	9

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Name and Signature of the Faculty Incharge

HoD/CSE

Register Number:

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Exam - I			Date/Session		Marks	50
Course code	CS8691	Course Title	ARTIFICIAL INTELLIGENCE			
Regulation	2017	Duration	90 minutes	Academic Year	2020-2021	
Year	III	Semester	VI	Department	CSE	

COURSE OUTCOMES

CO1:	Use appropriate search algorithms for any AI problem
CO2:	Represent a problem using first order and predicate logic
CO3:	Provide the apt agent strategy to solve a given problem
CO4:	Design software agents to solve a problem
CO5:	Design software agents to solve a problem
CO6:	Design applications for NLP that use Artificial Intelligence

Q.No.	Question	CO	BTS
	PART A (Answer all the Questions 10 x 2 = 20 Marks)		
1	What is meant by robotic agent?	1	1
2	Define an agent?	1	1
3	Define rational agent?	1	1
4	Give the general model of learning agent?	1	1
5	What is A.I?	1	1
6	How will you measure the problem-solving performance?	2	1
7	What is the application of BFS?	2	1
8	What is the power of heuristic search?	2	1
9	list some of the uninformed search techniques?	2	1
10	When is the class of problem said to be intractable?	2	1
	PART B (Answer all the Questions 2 x 10 = 20 Marks)		
11a	Explain properties of environment.	1	1
	OR		
11b	Explain in detail, the structure of different intelligent agents	1	1
12a	What is an agent? Explain the basic kinds of agent program.	1	1
	OR		
12b	Discuss any 2 uninformed search methods with examples	2	1
	PART C (Answer all the Questions 1 x 10 = 10 Marks)		
13a	Explain the A* search and give the proof of optimality of A*	2	1
	OR		
13b	Explain AO* algorithm with a suitable example. State the limitations in the algorithm?	2	1

Course Faculty
(Name /Sign / Date)

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

HoD
(Name /Sign / Date)

CS8691

Aritificial Inteligence
Answer Key

What is AI?

Artificial intelligence is the branch of computer science that deals with the automation of intelligent behavior. AI gives basis for developing human like programs which can be useful to solve real life problems and thereby become useful to mankind.

2. What is meant by robotic agent?

A machine that looks like a human being and performs various complex acts of a human being. It can do the task efficiently and repeatedly without fault. It works on the basis of a program feeder to it; it can have previously stored knowledge from environment through its sensors. It acts with the help of actuators.

3 Define an agent?

An agent is anything (a program, a machine assembly) that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators

4 Define rational agent?

A rational agent is one that does the right thing. Here right thing is one that will cause agent to be more successful. That leaves us with the problem of deciding how and when to evaluate the agent's success.

5 Give the general model of learning agent

Learning agent model has 4 components – 1) Learning element. 2) Performance element. 3) Critic 4) Problem Generator

6. How will you measure the problem-solving performance?

Problem solving performance is measured with 4 factors. 1) Completeness - Does the algorithm (solving procedure) surely finds solution if really the solution exists. 2) Optimality – If multiple solutions exits then do the algorithm returns optimal amongst them. 3) Time requirement. 4) Space requirement.

7. What is the application of BFS?

It is simple search strategy, which is complete i.e. it surely gives solution if solution exists. If the depth of search tree is small then BFS is the best choice. It is useful in tree as well as in graph search.

8. list some of the uninformed search techniques?

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

The uninformed search strategies are those that do not take into account the location of the goal. That is these algorithms ignore where they are going until they find a goal and report success. The three most widely used uninformed search strategies are 1.depth-first search-it expands the deepest unexpanded node 2.breadth-first search-it expands shallowest unexpanded node 3.lowest -cost-first search (uniform cost search)- it expands the lowest cost node

9. When is the class of problem said to be intractable?

The problems whose algorithm takes an unreasonably large amount of resources (time and / or space) are called intractable. For example – TSP Given set of 'N' points, one should find shortest tour which connects all of them. 16!□Algorithm will consider all N! Orderings, i.e. consider n = 16 > 250 which is impractical for any computer

10. What is the power of heuristic search?

search uses problem specific knowledge while searching in state space. This helps to improve average search performance. They use evaluation functions which denote relative desirability (goodness) of a expanding node set. This makes the search more efficient and faster. One should go for heuristic search because it has power to solve large, hard problems in affordable times.

PART B

11.A. Properties of Environment The environment has multifold properties – 1. Fully observable vs Partially Observable 2. Static vs Dynamic 3. Discrete vs Continuous 4. Deterministic vs Stochastic 5. Single-agent vs Multi-agent 6. Episodic vs sequential 7. Known vs Unknown 8. Accessible vs Inaccessible

Fully observable vs Partially Observable: o If an agent sensor can sense or access the complete state of an environment at each point of time then it is a fully observable environment, else it is partially observable. o A fully observable environment is easy as there is no need to maintain the internal state to keep track history of the world. o An agent with no sensors in all environments then such an environment is called as unobservable.
Deterministic vs Stochastic: o If an agent's current state and selected action can completely determine the next state of the environment, then such environment is called a deterministic environment. o A stochastic environment is random in nature and cannot be determined completely by an agent. o In a deterministic, fully observable environment, agent does not need to worry about uncertainty.
Episodic vs Sequential: o In an episodic environment, there is a series of one-shot actions, and only the current percept is required for the action. o However, in Sequential environment, an agent requires memory of past actions to determine the next best actions.
Static vs Dynamic: o If the environment can change itself while an agent is deliberating then such environment is called a dynamic environment else it is called a static environment. o Static environments are easy to deal because an agent does not need to continue looking at the world while deciding for an action. o However for dynamic environment, agents need to keep looking at the world at each action. o Taxi driving is an example of a dynamic environment whereas Crossword puzzles are an example of a static environment.

Discrete vs Continuous: o If in an environment there are a finite number of percepts and actions that can be performed within it, then such an environment is called a discrete environment else it is called continuous environment. o A chess gamecomes under discrete environment as there is a finite number of moves that can be performed.

11.B. The Structure of Intelligent Agents Agent's structure can be viewed as – Agent = Architecture + Agent Program

Architecture = the machinery that an agent executes on.

Agent Program = an implementation of an agent function.

Different forms of Agent As the degree of perceived intelligence and capability varies to frame into four categories as, A. Simple Reflex Agents B. Model Based Reflex Agents C. Goal Based Agents D. Utility Based agents (A)Simple Reflex Agents They choose actions only based on the current percept.

- They are rational only if a correct decision is made only on the basis of current precept.
- Their environment is completely observable.

• Condition-Action Rule – It is a rule that maps a state (condition) to an action. Example1: ATM system if PIN matches with given account number than customer get money. Example2: (B)Model Based Reflex Agents They use a model of the world to choose their actions. They maintain an internal state. Model –

The knowledge about how the things happen in the world. Internal State – It is a representation of unobserved aspects of current state depending on percept history. Updating the state requires the information about – How the world evolves

.□ How the agent's actions affect the world.

• Example: Car driving agent which maintains its own internal state and then take action as environment appears to it. Goal Based Agents They choose their actions in order to achieve goals. Goal-based approach is more flexible than reflex agent since the knowledge supporting a decision is explicitly

modeled, thereby allowing for modifications. Goal – It is the description of desirable situations. Example: Searching solution for 8-queen puzzle. Utility Based Agents They choose actions based on a preference (utility) for each state. Goals are inadequate when – There are conflicting goals, out of which only few can be achieved.

- Goals have some uncertainty of being achieved and you need to weigh likelihood of

• success against the importance of a goal. Example: Millitary planning robot which provides certain plan of action to be taken.

12.A. AGENT Introduction An AI system is composed of an agent and its environment.

The agents act in their environment. The environment may contain other agents. An agent is

anything that can perceive its environment through sensors and acts upon that environment through actuators. Sensor:

Sensor is a device which detects the change in the environment and sends the information to other electronic devices. An agent observes its environment through sensors. Actuators: Actuators are the component of machines that converts energy into motion.

The actuators are only responsible for moving and controlling a system. An actuator can be an electric motor, gears, rails, etc. Effectors:

Effectors are the devices which affect the environment. Effectors can be legs, wheels, arms, fingers, wings, fins, and display screen. A human agent has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors, and other organs such as hands, legs, mouth, for effectors. A robotic agent replaces cameras and infrared range finders for the sensors, and

- various motors and actuators for effectors. A software agent has encoded bit strings as its programs and actions Agent Terminology Performance Measure of Agent – It is the criteria, which determines how successful anagent is. Behavior of Agent – It is the action that agent performs after any given sequence of
- percepts. Percept – It is agent's perceptual inputs at a given instance
- Percept Sequence – It is the history of all that an agent has perceived till date
- Agent Function – It is a map from the precept sequence to an action

12.B. Breadth first search is a general technique of traversing a graph.

Breadth first search may use more memory but will always find the shortest path first. In this type of search the state space is represented in form of a tree.

The solution is obtained by traversing through the tree.

The nodes of the tree represent the start value or starting state, various intermediate states and the final state.

In this search a queue data structure is used and it is level by level traversal. Breadth first search expands nodes in order of their distance from the root. It is a path finding algorithm that is capable of always finding the solution if one exists.

The solution which is found is always the optional solution. This task is completed in a very memory intensive manner. Each node in the search tree is expanded in a breadth wise at each level.

Concept:

Step 1: Traverse the root node

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Step 2: Traverse all neighbours of root node.

Step 3: Traverse all neighbours of neighbours of the root node.

Step 4: This process will continue until we are getting the goal node.

Algorithm:

Step 1: Place the root node inside the queue.

Step 2: If the queue is empty then stops and return failure.

Step 3: If the FRONT node of the queue is a goal node then stop and return success

. Step 4: Remove the FRONT node from the queue.

Process it and find all its neighbours that are in readystate then place them inside the queue in any order.

Step 5: Go to Step 3.
Step 6: Exit.

Advantages:

In this procedure at any way it will find the goal. It does not follow a single unfruitful path for a long time. It finds the minimal solution in case of multiple paths.

Disadvantages:

BFS consumes large memory space. Its time complexity is more. It has long pathways, when all paths to a destination are on approximately the same search depth.

13.A. A* is a cornerstone name of many AI systems and has been used since it was developed in 1968 by Peter Hart; Nils Nilsson and Bertram Raphael. It is the combination of Dijkstra's algorithm and Best first search. It can be used to solve many kinds of problems. A* search finds the shortest path through a search space to goal state using heuristic function. This technique finds minimal cost solutions and is directed to a goal state called A* search. In A*, the * is written for optimality purpose. The A* algorithm also finds the lowest cost path between the start and goal state, where changing from one state to another requires some cost. A* requires heuristic function to evaluate the cost of path that passes through the particular state. This algorithm is complete if the branching factor is finite and every action has fixed cost. A* requires heuristic function to evaluate the cost of path that passes through the particular state. It

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022 – 2023 (ODD SEMESTER)

STUDENTS MARK STATEMENT- CO BASED
INTERNAL ASSESSMENT TEST-1

SUBJECT CODE &TITLE: CS8691& ARTIFICIAL INTELLIGENCE

YEAR/SEM: III/VI **MONTH & YEAR: Feb 2021**

S.NO	REG NO	STUDENT NAME	COX (32)	COX (18)	TOTAL (50)	TOTAL (100)
1.	811218104001	Aishwarya M	28	16	44	88
2.	811218104002	Ajith Kumar R	28	15	43	86
3.	811218104003	Aravindh Samy P	24	10	34	68
4.	811218104004	Arjun V	20	10	30	60
5.	811218104005	Dharshini A	14	08	22	44
6.	811218104006	Dinesh Kumar K	14	09	23	45
7.	811218104007	Gowtham K	19	18	37	74
8.	811218104008	Hariharan N	24	10	34	68
9.	811218104009	Hema Latha B	23	10	33	66
10.	811218104010	Jegathiswari.D	24	14	38	76
11.	811218104011	Joshi Dayana K	25	18	43	86
12.	811218104012	Kanagaraj K S	25	16	31	62
13.	811218104013	Kiruthiga V	28	14	42	84
14.	811218104014	Madhavan S	27	15	42	84
15.	811218104015	Mahendran S	28	16	44	88
16.	811218104017	Muthaiya P	28	15	43	86
17.	811218104018	Neethimozhi A	25	15	40	80
18.	811218104019	Nithya P	25	16	41	82
19.	811218104020	Nivedha S	25	16	41	82
20.	811218104021	Priyanga.G	20	08	28	56

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

21.	811218104022	Ramya R	25	15	40	80
22.	811218104023	Sharvesh Charan.S.A	14	08	22	44
23.	811218104024	Sathasivam P	14	09	23	46
24.	811218104026	Shalini P	25	15	40	80
25.	811218104027	Shanmuganathan P	24	14	38	76
26.	811218104028	Sheela.S	25	16	41	82
27.	811218104029	Sudhakaran C	24	16	40	80
28.	811218104030	Sugasini.G	25	18	43	86
29.	811218104031	Vaishnavi G	24	16	42	84
30.	811218104032	Vigna Sri S	25	16	41	82
31.	811218104033	Vijaya Dharani K	25	16	41	82
32.	811218104034	Vinothini S	24	14	38	76
33.	811218104501	Sivasangari C	25	14	39	78

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	-	4	3	8	7	6	-

Total No.of Candidates Present	33
Total No.of Candidates Absent	-
Total No.of Students Pass	29
Total No. of Students Fail	04
Percentage of Pass	87%

STAFF INCHARGE

HoD/CSE

PRINCIPAL

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 622 012, India
(Approved by AICTE, New Delhi and affiliated to Anna University, Chennai)

Internal Assessment Test Answer Book

Name	Aishwarya M			**Year/ Semester/Section**	III / V
Batch No.	8117A8104	**Date/Session**	17.02.2021	**Department**	CSE
Course code	CS8691	**Course Title**	Artificial Intelligence		
Internal Assessment Test	**IAT 1** ☑	**IAT 2** ☐	**IAT 3** ☐	**Model** ☐	
Name and Signature of the Invigilator with date	T. Aishwarya				

Instruction to the Student: Put tick mark to the question attended in the column against question.

Part A			Part B / Part C						Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a Marks	✓	b Marks		
1	✓	2	11		10				
2	✓	2	12				10		
3	✓	1	13		08				
4	✓	1	14						
5	✓	2	15						
6	✓	2	16						
7	✓	2					Total		28
8	✓	2							
9	✓	2							
10									
Total		16	Grand Total: 44				Name and Signature of the Examiner with date: T. Aishwarya		

To be filled by the examiner

Course Outcomes	1	2	3	4	5	6	Total
Marks allotted	18	32					
Marks Obtained	16	28					

IQAC Audit - Remarks

Name and Signature of the IQAC member

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG VALLEY, MANIDANDAM, TIRUCHIRAPPALLI – 620 012

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACADEMIC YEAR 2022 – 2023 (ODD SEMESTER)

STUDENTS MARK STATEMENT- CO BASED

INTERNAL ASSESSMENT TEST-1

SUBJECT CODE &TITLE: CS8691& ARTIFICIAL INTELLIGENCE

YEAR/SEM: III/VI **MONTH & YEAR:**

S.NO	REG NO	STUDENT NAME	COX (32)	COX (18)	TOTAL (50)	TOTAL (100)
1.	811218104005	Dharshini.A	14	08	22	44
2.	811218104006	DineshKumar K	14	09	23	46
3.	811218104023	Shaveen chavan.S	14	08	22	44
4.	811218104024	Sathasivam.P	14	09	23	46

MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	-	4	3	8	7	6	-

Total No.of Candidates Present	33
Total No.of Candidates Absent	-
Total No.of Students Pass	29
Total No. of Students Fail	04
Percentage of Pass	87%.

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

INDRA GANESAN COLLEGE OF ENGINEERING

IG Valley, Manikandam, Tiruchirappalli, Tamil Nadu – 620 012, India

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ROOT CAUSE ANALYSIS

Name of the Faculty : J. Jenifer
Degree & Program : B.E & CSE
IA Test : I /II/III/Model
Target : 95%.

Course Code & Name : CS8691 & Artificial Intelligence
Semester & Section : III / V
University Exam/Month & Year: NOV/2021
Achieved : 89%.

S.NO	BATCH NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	SIGNATURE OF THE STUDENT WITH DATE	CORRECTIVE ACTION TAKEN	PREVENTIVE ACTION TAKEN	FOLLOWUP STATUS	REMARKS OF THE HOD
1.	8112181040[illegible]	Dharshini.A	Sick	Dharshini	Retest	Special classes	Yes	-
2.	811218104[illegible]	Dinesh Kumar.K	not well	Dinesh.K	Retest	Special class	Yes	-
3.	811218104[illegible]	Sharvesh Charan.S.A	Fever	Sharvesh	Retest	Special class	Yes	-
4.	8112181040[illegible]	Sathasivam.P	Stomach pain	Sivam	Retest	Special class	Yes	-

Signature of the Faculty member

Dr. G. Balakrishnan, M.E., Ph.D.,
Principal
Indra Ganesan College of Engineering
IG Valley, Madurai Main Road
Manikandam, Trichy-620 012.

Signature of the HoD/CSE