A

Course File Report

On

"Artificial Intelligence"

Submitted by

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Department

of

Computer Science & Engineering

CMR ENGINEERING COLLEGE
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(2024-25, III-I Semester)

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COURSE INSTRUCTOR NAME: Dr. Mrutyunjaya S Yalawar.

ACADEMIC YEAR: 2024-25

SUBJECT NAME: ARTIFICIAL INTELLIGENCE

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CLASS ROOM NO: B201/B218

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SEM START DATE AND END DATE: 29-7-24 T0 26-12-24

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HOD

1. DEPARTMENT VISION & MISSION

- **VISION**

To produce globally competent and industry-ready graduates in Computer Science & Engineering by imparting quality education with the know-how of cutting-edge technology and holistic personality.

- **MISSION**

1. To offer high-quality education in Computer Science & Engineering in order tobuild core competence for the graduates by laying a solid foundation in Applied Mathematics and program frameworkwith a focus on concept building.
2. The department promotes excellence in teaching, research, and collaborative activities to prepare graduates for a professional career or higher studies.
3. Creating an intellectual environment for developing logical skills and problem-solving strategies, thus developing, an able and proficient computer engineer to compete in the current global scenario.

2.LIST OF PEOS, POS & PSOs

2.1 PROGRAM EDUCATIONAL OBJECTIVES (PEO):

PEO 1: Excel in professional career and higher education by acquiring knowledge of mathematical computing and engineering principles.
PEO 2: To provide an intellectual environment for analyzing and designing computing systems for technical needs.
PEO 3: Exhibit professionalism to adapt current trends using lifelong learning with legal and ethical responsibilities.
PEO 4: To produce responsible graduates with effective communication skills and multidisciplinary practices to serve society and preserve the environment.

2.2 .PROGRAM OUTCOMES:

Engineering Graduates will be able to satisfy these NBA graduate attributes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

8. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

9. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

10. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

11. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

2.3. PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: **Professional Skills and Foundations of Software development:** Ability to analyze, design and develop applications by adopting the dynamic nature of Software developments.

PSO2: **Applications of Computing and Research Ability**: Ability to use knowledge in cutting edge technologies in identifying research gaps and to render solutions with innovative ideas.

3. LIST OF CO's (ACTION VERBS AS PER BLOOM'S TAXONOMY)

COURSE OUTCOMES:

SUBJECT NAME: ARTIFICIAL INTELLIGENCE

CO1	**Understand** the various searching techniques, constraint satisfaction problems, and example problems- game playing techniques **.(Understanding)**
CO2	Apply these techniques in applications that involve perception, reasoning, and learning. .(**Applying)**
CO3	**Explain** the role of agents and how it is related to the environment and the way of evaluating it and how agents can act by establishing goals **.(Understanding)**
CO4	**Illustrate** the knowledge of real-world Knowledge representation. (**Understanding)**
CO5	**Analyze** and design a real-world problem for implementation and understand the dynamic behavior of a system. .**(Analyzing)**

REVISED Bloom's Taxonomy Action Verbs

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	• Choose • Define • Find • How • Label • List • Match • Name • Omit • Recall • Relate • Select • Show • Spell • Tell • What • When • Where • Which • Who • Why	• Classify • Compare • Contrast • Demonstrate • Explain • Extend • Illustrate • Infer • Interpret • Outline • Relate • Rephrase • Show • Summarize • Translate	• Apply • Build • Choose • Construct • Develop • Experiment with • Identify • Interview • Make use of • Model • Organize • Plan • Select • Solve • Utilize	• Analyze • Assume • Categorize • Classify • Compare • Conclusion • Contrast • Discover • Dissect • Distinguish • Divide • Examine • Function • Inference • Inspect • List • Motive • Relationships • Simplify • Survey • Take part in • Test for • Theme	• Agree • Appraise • Assess • Award • Choose • Compare • Conclude • Criteria • Criticize • Decide • Deduct • Defend • Determine • Disprove • Estimate • Evaluate • Explain • Importance • Influence • Interpret • Judge • Justify • Mark • Measure • Opinion • Perceive • Prioritize • Prove • Rate • Recommend • Rule on • Select • Support • Value	• Adapt • Build • Change • Choose • Combine • Compile • Compose • Construct • Create • Delete • Design • Develop • Discuss • Elaborate • Estimate • Formulate • Happen • Imagine • Improve • Invent • Make up • Maximize • Minimize • Modify • Original • Originate • Plan • Predict • Propose • Solution • Solve • Suppose • Test • Theory

Anderson, L. W., & Krathwohl, D. R. (2001). A taxonomy for learning, teaching, and assessing, Abridged Edition. Boston, MA: Allyn and Bacon.

Action Words for Bloom's Taxonomy					
Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Create**
define	explain	solve	analyze	reframe	design
identify	describe	apply	compare	criticize	compose
describe	interpret	illustrate	classify	evaluate	create
label	paraphrase	modify	contrast	order	plan
list	summarize	use	distinguish	appraise	combine
name	classify	calculate	infer	judge	formulate
state	compare	change	separate	support	invent
match	differentiate	choose	explain	compare	hypothesize
recognize	discuss	demonstrate	select	decide	substitute
select	distinguish	discover	categorize	discriminate	write
examine	extend	experiment	connect	recommend	compile
locate	predict	relate	differentiate	summarize	construct
memorize	associate	show	discriminate	assess	develop
quote	contrast	sketch	divide	choose	generalize
recall	convert	complete	order	convince	integrate
reproduce	demonstrate	construct	point out	defend	modify
tabulate	estimate	dramatize	prioritize	estimate	organize
tell	express	interpret	subdivide	find errors	prepare
copy	identify	manipulate	survey	grade	produce
discover	indicate	paint	advertise	measure	rearrange
duplicate	infer	prepare	appraise	predict	rewrite
enumerate	relate	produce	break down	rank	role-play
listen	restate	report	calculate	score	adapt
observe	select	teach	conclude	select	anticipate
omit	translate	act	correlate	test	arrange
read	ask	administer	criticize	argue	assemble
recite	cite	articulate	deduce	conclude	choose
record	discover	chart	devise	consider	collaborate
repeat	generalize	collect	diagram	critique	collect
retell	give examples	compute	dissect	debate	devise
visualize	group	determine	estimate	distinguish	express
	illustrate	develop	evaluate	editorialize	facilitate
	judge	employ	experiment	justify	imagine
	observe	establish	focus	persuade	infer
	order	examine	illustrate	rate	intervene
	report	explain	organize	weigh	justify
	represent	interview	outline		make
	research	judge	plan		manage
	review	list	question		negotiate
	rewrite	operate	test		originate
	show	practice			propose
	trace	predict			reorganize
	transform	record			report
		schedule			revise
		simulate			schematize
		transfer			simulate
		write			solve
					speculate
					structure
					support
					test
					validate

4. Syllabus copy

Unit– I	Introduction to AL Intelligent Agents, problem-Solving Agents, Searching for Solution, Uninformed Search Strategies: Breadth First search, Uniform cost search, Depth-first search, Iterative deepening, Depth-first search, Bidirectional search., Informed (Heuristic) Search Strategiess: Greedy best-first search., A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, simulated search, Local Search in Continuous Spaces.
Unit– II	**Problem Solving by Search-II and Propositional Logic Adversarial Search:** Games, Optimal Decisions in Games, Alpha-Beta Pruning. Imperfect Real-Time Decisions, Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs. The Structure or Problems. Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, **Propositional Logic:** Propositional Theorem Proving: lnference and proof & Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.
Unit– III	**Logic and Knowledge Representation** **First-Order Logic:** Representation, Syntax and Semantics of First-Order Logic, Using First-Order logic, Knowledge Engineering in First-Order Logic. **Inference in First-Order Logic:** Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.
Unit– IV	**Knowledge Representation:** Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories_ Reasoning with Default information. **Classical Planning:** Definition of Classical Planning., Algorithms for Planning with State-Space Search, Planning Graphs. other Classical Planning Approaches, Analysis of Planning approaches.
Unit– V	**Uncertain knowledge and Learning Uncertainty:** Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes Rule and Its Use. **Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks. Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning: Dempster-Sharer theory.

4.1 References (Text books/websites/Journals)

TEXT BOOK:

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCES BOOKS:

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1. Artificial Intelligence ,3rd Edn,E.Rich and K.Knight(TMH)
2. Artificial Intelligence,3rd Edn.,Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems–Patterson, Pearson Education.

Journals with min 5 ref paper for literature study

1.QTCP: Adaptive Congestion Control with Reinforcement Learning https://sci-hub.mksa.top/10.1109/TNSE.2018.2835758

2. A comparative Approach To Predict Corona Virus Using Machine Learning

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9395827

3. Machine Learning and Internet of Things based Smart Agriculture

https://sci-hub.mksa.top/10.1109/ICACCS48705.2020.9074472

4. Machine Learning Applications for Precision Agriculture: A Comprehensive Review

https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9311735

5. A Survey on Various Machine Learning Models in IOT Applications

https://sci-hub.mksa.top

5. INDIVIDUAL TIME TABLE (MRUTYUNJAYA S YALAWAR)

Mr. Mrutyunjaya S Yalawar

	I(9:10-10:10)	II(10:10-11:00)	III(11:00-11:50)	IV(11:50-12:40)		V(1:20-2:20)	VI(2:20-3:10)	VII(3:10-4:00)
MON	**III-C**			**III-A**			**III-A AI LAB**	
TUE			**III-C**				**III C AI LAB**	
WED	**III-A**		**III-C**				**III-C AI LAB**	
THU		**III-C**					**III-A**	
FRI			**III-A AI LAB**				**III-C**	
SAT	**III-A**					**III-A**		**III-C**

6. Session plan

S.NO	Topic (R22 syllabus)	Sub-Topic	NO. OF LECTURES REQUIRED	Suggested Books	Teaching Methods
1	**UNIT – I** **Introduction to AI**	Introduction to AI Concepts	**L1**	T1	M1/M4
2		Problem solving agents	**L2**	T1	M1/M4
3		Uninformed Search	**L3**	T1	M1/M4
4		BFS,DFS,IDDFS	**L4**	T1,R1	M1/M4
5		Informed Search	**L5**	T1,R1	M1/M4
6		Greedy best-first Search	**L6**	T1,R1	M1/M4
7		A* Search algorithm	**L7, L8**	T1,R1	M1/M4
8		Heuristic functions	**L9**	T1,R1	M1/M4
9		Hill Climbing Search	**L10**	T1,R1	M1/M4
10		Local Search concept	**L11, L12**	T1,R1	M1/M4
11	**Unit – II Problem**	Problem Solving	**L13**	T1,R1	M1/M4

12	**Solving by Search-II and Propositional Logic**	Games, Decisions in game	**L14**	T1,R1	M1/M4
13		Alpha-Beta Pruning Concept	**L15**	T1,R1	M1/M4
14		CSP Problems	**L16**	T1,R1	M1/M4
15		Backtracking Search	**L17**	T1,R1	M1/M4
16		Wumpus World Logic	**L18**	T1,R1	M1/M4
17		Propositional theorem	**L19**	T1,R1	M1/M4
18		Horn Clauses	**L20**	T1,R1	M1/M4
19		Forward and Backward	**L21, L22**	T1,R1	M1/M4
20		Agent based on Propositional logic	**L23**, **L24**	T1,R1	M1/M4
21	**Unit – III Logic and Knowledge Representation**	FOL Concepts	**L25**	T1,R1	M1/M4
22		Representation, Syntax	**L26**	T1,R1	M1/M4
23		FOL	**L27**	T1,R1	M1/M4
24		Knowledge Engineering	**L28**	T1,R1	M1/M4
25		Inference in FOL	**L29**	T1,R1	M1/M4
26		Propositional Vs FOI	**L30**	T1,R1	M1/M4
27		Unification and Lifting	**L31**	T1,R1	M1/M4
28		Forward Chaining	**L32**	T1,R1	M1/M4
29		Backward Chaining	**L33**	T1,R1	M1/M4
30		Resolutions	**L34**	T1,R1	M1/M4
31	**Unit – IV Knowledge Representation**	Ontological Engineering	**L35, L36**	T1,R1	M1/M4
32		Categories and Objects	**L37**	T1,R1	M1/M4
33		Events, Mental Events	**L38, L39**	T1,R1	M1/M4
34		Reasoning System	**L40**	T1,R1	M1/M4
35		Classical Planning	**L41**	T1,R1	M1/M4
36		Algorithm for planning	**L42**	T1,R1	M1/M4
37		Planning Graphs	**L43**	T1,R1	M1/M4
38		Other Classical graphs	**L44, L45**	T1,R1	M1/M4
39		Approaches	**L46**	T1,R1	M1/M4
40		Analysis of planning	**L47**	T1,R1	M1/M4
41		Introduction	**L48**	T1,R1	M1/M4

42	**Unit – V Uncertain Knowledge and Learning Uncertainty**	Acting under uncertainty	**L49**	T1,R1	M1/M4
43		Basic Probability	**L50**	T1,R1	M1/M4
44		Inference using full Joint distribution	**L51**	T1,R1	M1/M4
45		Independence concept	**L52**	T1,R1	M1/M4
46		Bayes Rule and use	**L53**	T1,R1	M1/M4
47		Bayesian networks	**L54**	T1,R1	M1/M4
48		Conditional probabilities	**L55**	T1,R1	M1/M4
49		Relational & first order Probability	**L56**	T1,R1	M1/M4
50		Other approaches	**L57**	T1,R1	M1/M4
51		Dempster-Shafer theory	**L58, L59**	T1,R1	M1/M4

TOTAL CLASSES =59

METHODS OF TEACHING

M1:Lecture Method	M6:Tutorial
M2 : Demo Method	M7: Assignment
M3:Guest Lecture	M8:Industry Visit
M4:Presentation/PPT	M9:Project Based
M5 : Lab/Practical	M10 : Charts / OHP

7. Session Execution Log

S No	Unit	Scheduled completed date	Completed date	Remarks
1	I	29/07/2024	21/08/2024	COMPLETED
2	II	26/08/2024	11/09/2024	COMPLETED
3	III	16/09/2024	07/10/2024	COMPLETED
4	IV	16/10/2024	06/11/2024	COMPLETED
5	V	07/11/2024	26/11/2024	COMPLETED

8. Lecture Notes

Attached

9. Assignment Questions along with sample Assignment Script

Assignment-1

Academic Year :2024-2025 (III-I SEM)

ASSIGNMENT PAPER-1

1. Compare rational agents and rationality? Discuss Depth First Search Algorithm? (CO1)

2. What is heuristic Search? Explain

a) A* Search Algorithm

b) Greedy Best First Search Algorithm? (CO1)

3. a) What is Decision Tree? Explain in detail about Alpha beta Pruning?

b) What are CSPs? Explain CSP problem in Backtracking (CO2)

4. a) Elaborate on Knowledge based agents? Explain in detail about Wumpus World logic?(CO2)

b) Define Horn clauses and clauses .Write simple forward and backward chaining. (CO2)

5. What is First order Logic? Explain syntax and semantics of First Order Logic

Assignment-II

1. What is Unification and Lifting and Explain First order Inference (CO3)

2. Explain Ontological Engineering & Reasoning systems for categories? (CO4)

3. What is Classical planning and in detail about Planning Graphs? (CO4)

4. Explain uncertainty and inference using Joint Distributions. (CO5)

5. Explain Dempster Shafer Theory and the semantics of Bayesian Networks (CO5)

10. Mid exam Question Papers along with sample Answer Scripts

III.B.TECH- I-SEM-I MID EXAMINATION ***Date:*** **Time:** 03.10.2024***/01:30-03:30 PM***

Subject: Artificial Intelligence (CS502PC) **Branch: Common to CSE & IT** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (2 1/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a,b,c sub questions.

PART-A **5x2=10**

1. What is artificial intelligence and what are its applications? (CO1)
2. Name the different uninformed search strategies. (CO1)
3. Define propositional logic and list out the connectives used in propositional logic (CO2)
4. Define Heuristic Search Strategies with an example. (CO1)
5. What is an Inference Engine? (CO2)

PART-B **4X5=20**

6. Discuss Forward chaining and backward chaining with example (CO2)
7. Describe the Agents and Environments. What are the different structures of Agents? (CO1)
8. Explain the principle of the Alpha-Beta pruning problem with example. (CO2)
9. Explain in detail the following search problems, (CO2)
   i) 8-Puzzle Problem.
   ii) Wumpus World.
10. Describe the optimal decisions in the game and Imperfect real-time decisions. (CO2)
11. Elucidate about Knowledge Base (KB) and Structure of Problems (CO3)

CMR ENGINEERING COLLEGE

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Kandlakoya (V), Medchal (M), Medchal - Malkajgiri (D)-501401

III.B.TECH- I-SEM-II MID EXAMINATION ***Date:*** **Time: 15.12.2024/01:30-03:30 PM**

Subject: Artificial Intelligence (CS502PC) **Branch: Common to CSE & IT** **Marks: 30 M**

Note: Question paper contains two parts, Part - A and Part - B.

Part-A is compulsory which carries 10 marks. Answer all questions in part-A.

Part-B consists of (2 1/2) units. Answer any one full question from each unit. Each question carries 5 marks and may have a,b,c sub questions.

PART-A **5x2=10**

1.	Write some basic inference rules in FOL?	(CO5)
2.	What is Knowledge Representation give an example.	(CO4)
3.	What is Existential in logical representation?	(CO4)
4.	Briefly describe ontology engineering?	(CO4)
5.	What is unification?	(CO3)

PART-B **4X5=20**

6. List out with Syntax of FOL Basic elements	(CO3)
7. Elucidate Techniques of Knowledge Representation in AI	(CO4)
8. a) Write Forward Chaining Algorithm b) Write an example of backward chaining.	(CO4)
9. Describe STRIPS Representation with an example.	(CO5)
10. Discuss classical planning with state-space Search and planning.	
11. Explain probability reasoning and Dempster Shafer's theory.	(CO5)

11. Scheme of Evaluation

MID-I

S.NO	Q.NO	THEORY	MARKS	TOTAL
PART-A				
1	1	DEFINITION	2	2
2	2	DEFINITION	2	2
3	3	DEFINITION	2	2
4	4	DEFINITION,EXAMPLE	2	2
5	5	REASONS	2	2
PART-B				
6	6	EXPLANATION	3+2	5
7	7	DEFINITION,DIAGRAM	3+2	5
8	8	EXAMPLE	3+2	5
9	9	DEFINITION, DIAGRAM	3+2	5
10	10	DEFINITION, EXAMPLE EXPLANATION	5	5
11	11	EXPLANATION	5	5

MID-II

S.NO	Q.NO	THEORY	MARKS	TOTAL
PART-A				
1	1	DEFINITION	2	2
2	2	DEFINITION	2	2
3	3	DEFINITION	2	2
4	4	DEFINITION,EXAMPLE	2	2
5	5	REASONS	2	2
PART-B				
6	6	EXPLANATION	3+2	5
7	7	DEFINITION,DIAGRAM	3+2	5
8	8	THEOREM,EXAMPLE	3+2	5
9	9	DEFINITION, EXAMPLE	3+2	5
10	10	EXPLANATION	5	5
11	11	EXPLANATION	5	5

12. Mappings of Cos with Pos and PSOs

COURSE	Relationship of Course outcomes to Program Outcomes (PO AVG)													
CO-PO&PSO MATRIX	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	
CO1	3	3												
CO2												3		
CO3		2							2				3	
CO4				2	2							3		
CO5	3		2		2				2				2	
AVERAGE	**3**	**3**	**2**	**2**	**2**				**2**			**3**	**3**	

13. COs, POs, PSOs Justification

Justification:

CO1: Understand the various searching techniques, constraint satisfaction problems, and example problems- game playing techniques **.(Understanding)**
Correlated with PO1 High: Strongly mapped as students will be able to gain the knowledge of various searching techniques, constraint satisfaction problems, and example problems- game playing techniques
correlated with PO2 high: strongly mapped as students will be able to analyze problem solving method

CO2: Apply these techniques in applications that involve perception, reasoning, and learning. .(**Applying)**
Correlated with PSO1 High: Strongly mapped as students will be able to analyze techniques in applications that involve perception, reasoning, and learning.

CO3: Explain the role of agents and how it is related to the environment and the way of evaluating it and how agents can act by establishing goals **.(Understanding)**
Correlated with PO2 moderately: Moderately mapped as students will be able to analyze the the role of agents and how it is related to the environment and the way of evaluating it and how agents can act by establishing goals
Correlated with PO9 moderately: Moderately mapped as students will be able to design new techniques for evaluating the agents can act by establishing goals.
Correlated with PSO2 highly: highly mapped to students to Ability to use knowledge in technologies in identifying research gaps and to render solutions with innovative ideas.

CO4: Illustrate the knowledge of real-world Knowledge representation. (**Understanding)**
Correlated with PO4 moderately: moderately mapped as students will be able to get the knowledge of real-world Knowledge representation
Correlated with PO5 moderately: moderately mapped as students will be able to choose the different techniques to get knowledge of real-world Knowledge representation.

Correlated with PSO1 High: Strongly mapped as students will be able to analyze, design and develop applications to get real-world Knowledge.

CO5: Analyze and design a real-world problem for implementation and understand the dynamic behavior of a system. .**(Analyzing)**
Correlated with PO1 highly: Strongly mapped as students to design a real-world problem
Correlated with PO3 moderately: moderately mapped as students will be able to apply the real-world problem for implementation and understand the dynamic behavior of a system
Correlated with PO5 moderately: moderately mapped as students will be able to choose the different techniques in real world problems.
Correlated with PO9 moderately: moderately mapped as students will be able to design new techniques for evaluating understand the dynamic behavior of a system
Correlated with PO11 moderately: moderately Recognition of the need for and an ability to implement dynamic behavior of a system
Correlated with PSO2 moderately: moderately mapped as students will be able to use knowledge in technologies in identifying research gaps and to render solutions with innovative ideas.

14. Attainment of Cos, Pos and PSOs (Excel sheet)

		PROGRAM OUTCOMES																																									
		PO1			PO2			PO3			PO4			PO5			PO6			PO7			PO8			PO9			PO10			PO11			PO12		
		TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG	TPI	M.P	MG
SE OUTCOMES	CO1	5	3	2	14	6	2	14	5	2	8	4	2	6	1	1	2		0	4		0	3	1	1	7	2	1	7	2	1	5	3	2	6	2	1						
	CO2	5	3	2	14	5	2	14	4	2	8	2	1	6	1	1	2		0	4	1	1	3		0	7	1	1	7	1	1	5	1	1	6	1	1						
	CO3	5	2	2	14	3	1	14	3	1	8	1	1	6	2	1	2		0	4		0	3	1	1	7		0	7	1	1	5		0	6	1	1						
	CO4	5	4	3	14	1	1	14	2	1	8	2	1	6	1	1	2	1	2	4	1	1	3		0	7		0	7	1	1	5	1	1	6		0						
	CO5	5	3	2	14	2	1	14	2	1	8	2	1	6	2	1	2	1	2	4	1	1	3		0	7	1	1	7		0	5	2	2	6	1	1						

TPI: Total Performance Indicators

MPI:Mapped Performance Indicators

MG:Mapping Grade

15. Previous Question Papers

P.CODE:37336 | R05 | SET- 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOV/DEC, 2009
ARTIFICIAL INTELLIGENCE
(Common to CSE, ECC)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

- - -

1. Devise an AO* algorithm and explain how it is not suitable for searching in And-OR graphs [16]

2. a) Differentiate between forward and backward reasoning
   b) Explain about A* algorithm in detail [8+8]

3. a) Justify the need for computable functions and predicates in logic.
   b) What is the significance of knowledge representation? Give differences between database and knowledge base [8+8]

4. Transform the following to conceptual dependencies:
   I gave pen to my friend
   Rama eat ice cream
   I borrowed book from your friend
   While going home, I saw a frog [16]

5. Write a short notes on the following
   a) Minimalist reasoning
   b) Non – dependency directed back tracking
   c) Abduction
   d) Non – Monotonic reasoning [16]

6. a) Explain hierarchial planning with relevant examples.
   b) Explain Alpha – Beta Pruning [8+8]

7. What are the prominent features of an expert system and describe their features in detail. [16]

8. Write short notes on the following:-
   a) Route learning
   b) Induction
   c) Epistemology
   d) Decision Trees. [16]

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Code No: 157AM

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, July/August - 2022

ARTIFICIAL INTELLIGENCE

(Computer Science and Engineering)

Time: 3 Hours **Max.Marks:75**

Answer any five questions

All questions carry equal marks

1.a) Define Artificial intelligence in terms of acting humanly and thinking rationally.

b) Describe the factors of formulating a problem. Give the example of eight queen problem. [7+8]

2.a) Write a short note on model based reflex agents and utility based agents.

b) Give an overview of genetic algorithms. Give the advantages of it. [7+8]

3.a) Describe how Alpha-Beta search works with relevant examples.

b) How an intelligent backtracking is better than chronological backtracking explain with an example. [7+8]

4.a) Explain the job-shop scheduling problem with various constraints.

b) Describe the semantics of propositional logic with the truth table. [7+8]

5.a) What is meant by universal and existential quantification? Give examples for each.

b) Explain the resolution algorithm used for reasoning under first order logic with an example. [7+8]

6.a) Explain the steps used in knowledge engineering process with the example electronic circuit domain.

b) Write a short note on events and processes with examples. [7+8]

7.a) Explain about analysis of planning approaches.

b) Explain multi-agent planning. [7+8]

8.a) Explain about Bayesian nets with continuous variables.

b) Analyze the top–down inductive learning methods and inductive learning with inverse deduction. [7+8]

---oo0oo---

Code No.: CS502PC | R20 | H.T.No. | | | 8 | R | | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Regular) - December- 2022
ARTIFICIAL INTELLIGENCE
(Common for CSE, IT)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks.

PART-A **(20 Marks)**

1.	a)	What is Artificial Intelligence?	[2M]
	b)	What is Heuristic Function?	[2M]
	c)	What is propositional logic?	[2M]
	d)	Define First order Logic?	[2M]
	e)	What are the limitations in using propositional logic to represent the knowledge base?	[2M]
	f)	How many types of inference mechanisms are there?What are they?	[2M]
	g)	Explain Rote learning?	[2M]
	h)	What is learning?	[2M]
	i)	List out the problem areas addressed by Expert systems.	[2M]
	j)	What are the characteristics of expert systems?	[2M]

PART-B **(50 Marks)**

2.		What is Artificial Intelligence and Artificial Intelligence technique? Briefly explain how AI Technique can be represented and list out some of the task domain of AI.	[10M]
		OR	
3.		Discuss the following search technique with the help of an example. Also discuss the benefits and shortcoming of each i)Breadth First Search ii)Depth First Search	[10M]
4.		Explain the forward chaining process in detail with example? What is the need of incremental chaining?	[10M]
		OR	
5.		Write the algorithm for deciding entailment in propositional logic.	[10M]
6.		Explain about Baye's rule and its use.	[10M]
		OR	
7.		How it is useful for decision making under uncertainty about knowledge?	[10M]
8.		What is learning? Explain about Rote learning?	[10M]
		OR	
9.		Describe the role of information gain in decision tree learning.	[10M]
10.		With neat sketch explain the architecture, characteristic features and roles of expert system.	[10M]
		OR	
11.		Discuss about the Knowledge Acquisition process in expert systems.	[10M]

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Code No.: DS602PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–II–Semester End Examinations (Regular) - May- 2023
ARTIFICIAL INTELLIGENCE
(CSD)

[Time: 3 Hours] **[Max. Marks: 70]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(20 Marks)**

1. a)	List applications of AI?	[2M]
b)	Define state space search.	[2M]
c)	What is a predicate logic statement?	[2M]
d)	What is semantic network?	[2M]
e)	List applications of expert systems?	[2M]
f)	What is the Dempster theory of Shafer?	[2M]
g)	What is Supervised Learning?	[2M]
h)	What is Neural Network?	[2M]
i)	Define NLP (Natural language Processing).	[2M]
j)	What is case grammar?	[2M]

PART-B **(50 Marks)**

2.	Explain different Categories of Heuristic Search Techniques in AI?	[10M]
	OR	
3.	What are the main sub areas of artificial intelligence? Explain.	[10M]
4.	Discuss syntax and semantics of Propositional logic with examples.	[10M]
	OR	
5.	Discuss about Knowledge Representation using Frames.	[10M]
6.	Explain the Expert System Architecture with the help of a neat diagram.	[10M]
	OR	
7.	Discuss the Bayesian Belief networks with an example.	[10M]
8.	What is machine learning? Explain about inductive and deductive learning.	[10M]
	OR	
9.	Write a short note on the following:	
a)	Support Vector Machines.	[5M]
b)	Radial-Basis Function Networks.	[5M]
10.	List and explain the applications of Natural Language Processing.	[10M]
	OR	
11.	Give a brief note on Semantic Analysis.	[10M]

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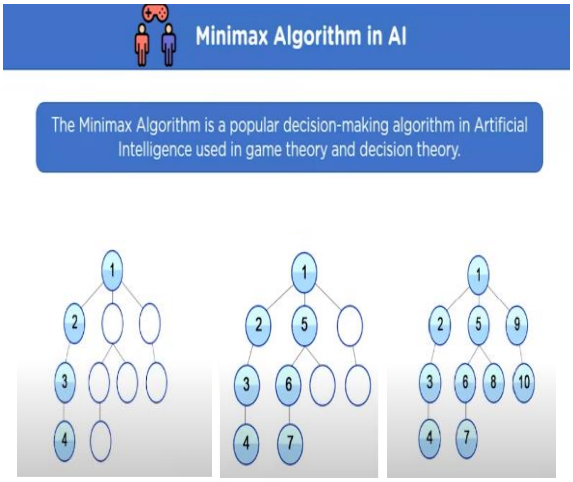
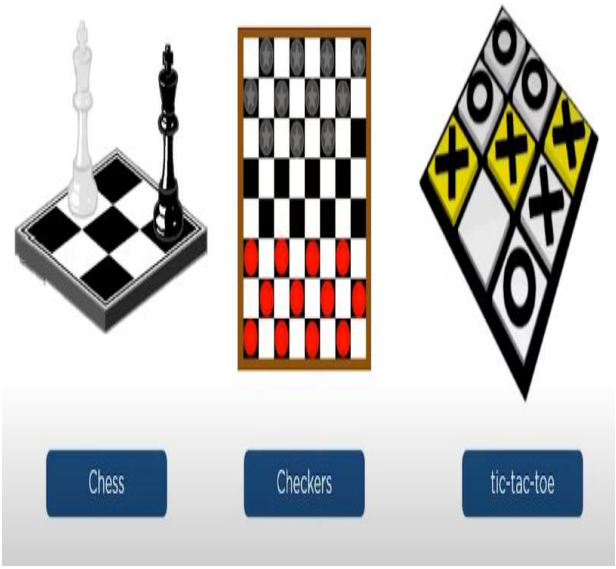
16. Power Point Presentations (PPTs)

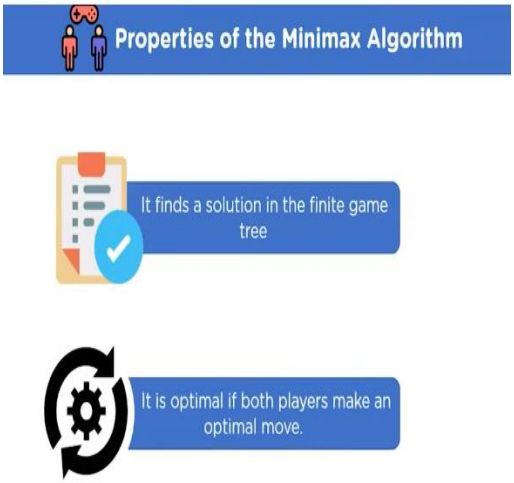
UNIT-2

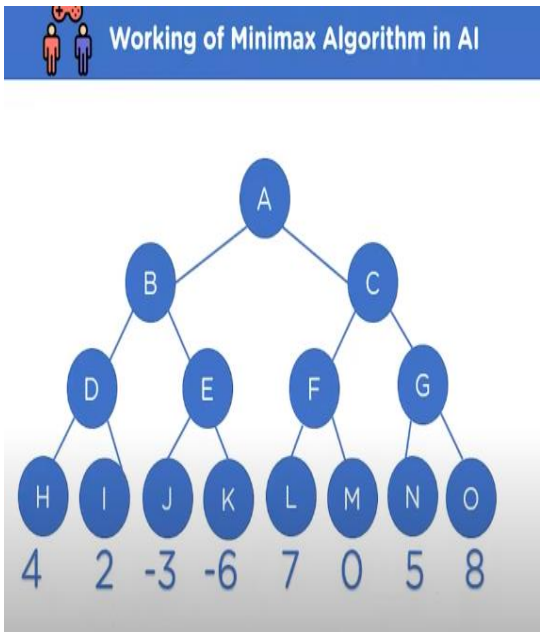
Advanced Search

Mini-max Search Algorithm in Artificial Intelligence








Working of Minimax Algorithm in AI
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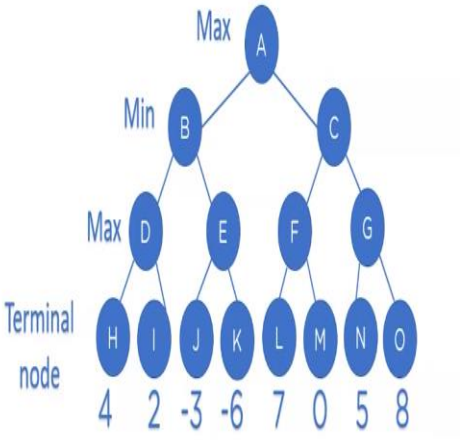
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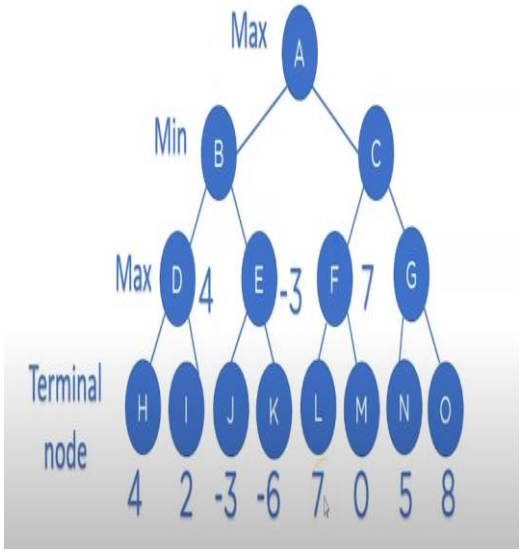
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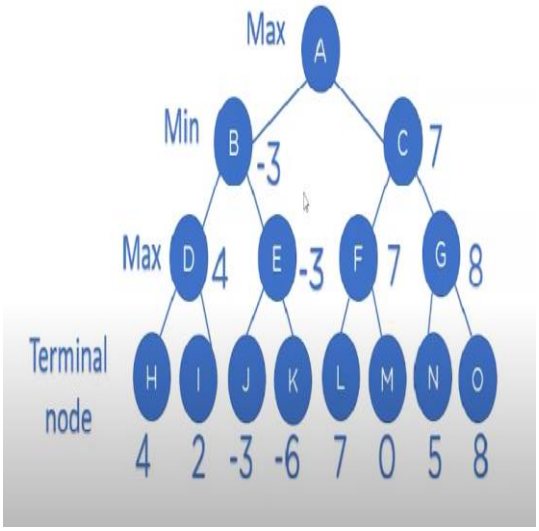
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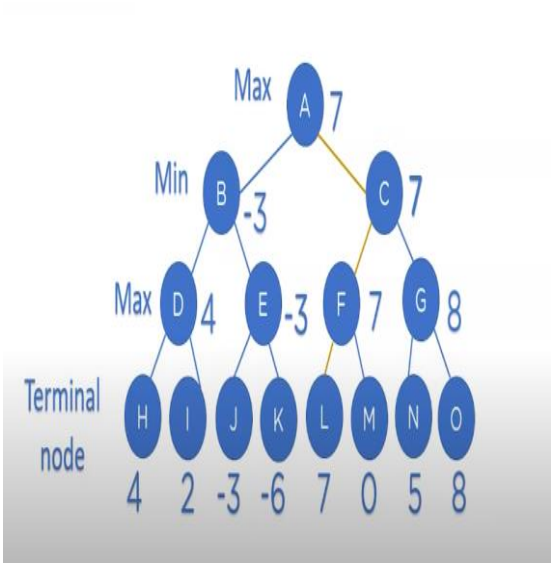
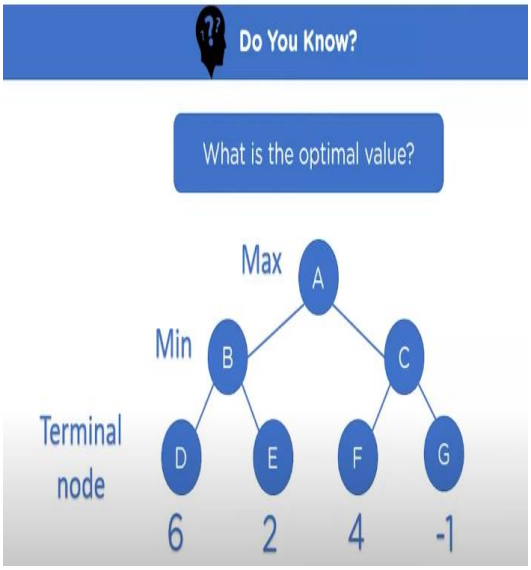




ALPHA-BETA PRUNING

- Alpha-beta pruning can be applied at any tree depth, and sometimes it prunes the tree leaves and the entire sub-tree.

- The two-parameter can be defined as:

Alpha: The best (highest-value) choice we have found so far at any point along the path of Maximizer. The initial value of alpha is -∞.

Beta: The best (lowest-value) choice we have found so far at any point along the path of Minimizer. The initial value of beta is +∞.

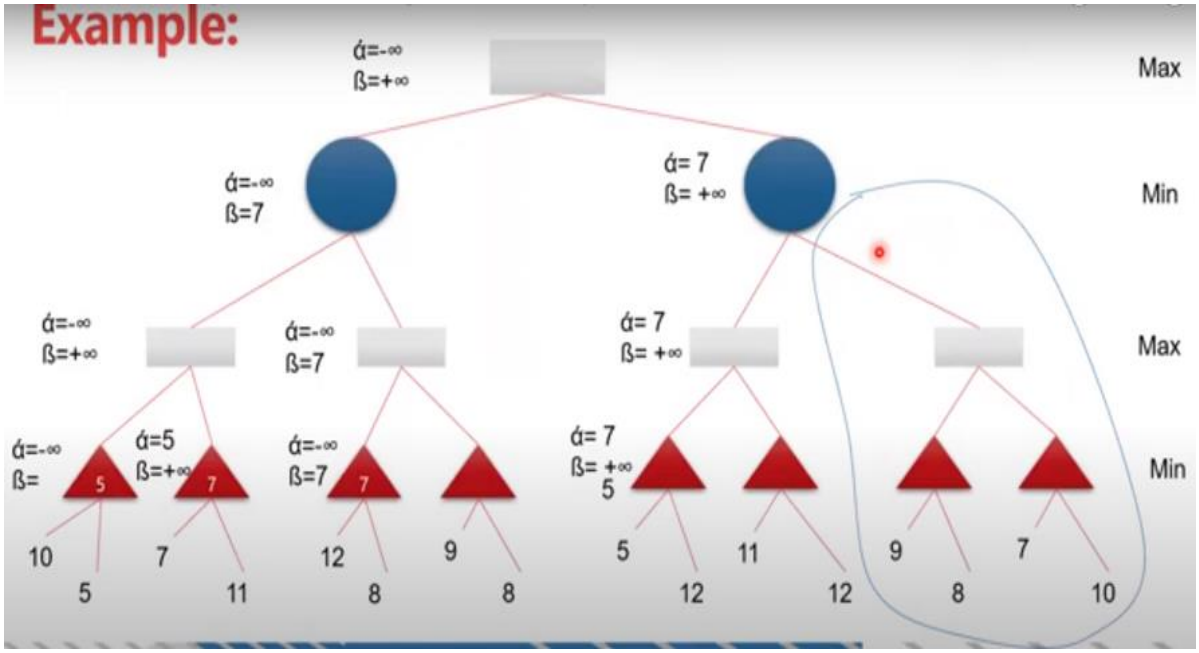
Condition of pruning:

Condition for Alpha-beta pruning:
The main condition which required for alpha-beta pruning is:

$\alpha >= \beta$

Points about Alpha-Beta Pruning:

- The Max player will only update the value of alpha.
- The Min player will only update the value of beta.
- While backtracking the tree, the node values will be passed to upper nodes instead of values of alpha and beta.
- We will only pass the alpha, beta values to the child nodes.



17. Innovative Teaching method if any (Attached Innovative Assignment)

QUESTIONS

1. Draw the mind map of Structure of Agents?(CO1)

2. Summarize any journal on Bayesian Belief Networks and explain with neat diagram?(CO3)

18. References (Textbook/Websites/Journal)

1. Artificial Intelligence, 3rd Edn,E.Rich and K.Knight(TMH)

2. Artificial Intelligence, 3rdEdn. Patrick Henny Winston, Pearson Education.

3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems–Patterson, Pearson Education

Websites or URLs e- Resources

UNIT	CONTENT /TOPIC DETAILS	HYPERLINKDETAILS
UNIT -1	Introduction to Artificial Intelligence	https://nptel.ac.in/courses/106105077 https://onlinecourses.nptel.ac.in/noc22_cs56/preview https://onlinecourses.nptel.ac.in/noc22_cs83/preview?user_email=mettu.jhansilakshmi@cmrec.ac.in
UNIT -2	Advanced Search-strategies	**https://onlinecourses.nptel.ac.in/noc22_cs56/preview** **https://onlinecourses.nptel.ac.in/noc22_cs67/preview?user_email=mettu.jhansilakshmi@cmrec.ac.in**
UNIT -3	Logic and Knowledge Representation	**https://nptel.ac.in/courses/106105077** **https://www.youtube.com/watch?v=GHpchgLoDvI&list=PLp6ek2hDcoNB_YJCruBFjhF79f5ZHyBuz&ab_channel=IITDelhiJuly2018**
UNIT -4	Learning	**https://nptel.ac.in/courses/106105077**
UNIT -5	Expert Systems	**https://nptel.ac.in/courses/106105077** **https://www.javatpoint.com/artificial-intelligence-tutorial**