Faculty Details

Name of the Faculty: Ms.Kanchan

Designation: Assistant Professor

Department: Computer Science and engineering

Course Details

Name of the Programme: B.Tech.   Batch: 2014-2018

Branch: CSE   Section: B

Name of Subject: Artificial Intelligence   Subject Code: NCS 702

Category of Course: Core Subject

Dr. Somesh Kumar
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Moradabad-244001

		SESSION-2017-2018
	Index	
In Pursuit of Excellence		SEM-VII

Dr. Somesh Kumar
Prof. & Head, CSE
Moradabad Institute of Technology
Moradabad-244001

Dr. Somesh Kumar
Prof. & Head, CSE
Moradabad Institute of Technology
Moradabad-244001

Vision of Institute

A technical education system producing skilled manpower of highest quality to meet complex technological needs for economic development of the country.

Mission of Institute

To transform the Institute into one of the leading technical institutions of the country, with the aim of producing engineers of high caliber having technical competence of internationally accepted levels with high professional ethics, national and human values and responsive to community needs.

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Dr. Somesh Kumar
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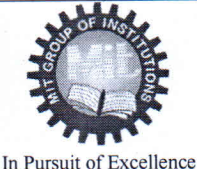
Vision of Department

A center of excellence in the field of computer science and engineering producing quality graduates as globally recognized professionals in industry and research organizations.

Mission of Department

To transform the department into one of the leading computer science and engineering departments of the country with aim of producing globally recognized engineering graduates who are not only job seekers but also the entrepreneurs and are also aware about their responsibilities towards nation with high professional and ethical values.

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Moradabad-244001

Program Education Objectives

PEO 1 : Work productively as Computer Engineers or IT Professionals, including supportive and leadership roles on multidisciplinary teams.

PEO 2 : Communicate effectively, recognize and incorporate social needs and constraints in their professional endeavors, and practice their profession with high regard to legal and ethical responsibilities.

PEO 3 : Engage in life-long learning, such as graduate study, to remain current in their profession and be leaders in our technological society.

PEO4 :To provide students with a sound foundation in the mathematical , scientific and engineering fundamentals necessary to formulate , solve and analyze engineering problems and to prepare them for graduate studies

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Program Outcomes

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

2. Problem analysis: Identify, formulate, research literature, and analyse 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 public health and safety, and 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 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.
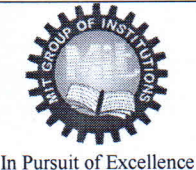
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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

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

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with the 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.

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11. 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.

12. 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.

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After completing their graduation, students of Computer Science and Engineering will be able to -

PSO1: Apply the logical and critical thinking gained in Computer Science courses to identify, formulate and solve complex problems.

PSO2: Solve real world engineering problems to benefit the society.

PSO3: Reduce uncertainty and remove bottlenecks in designing and developing software applications.

PSO4: Apply various testing & maintenance approaches on software system applications.

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Moradabad Institute of Technology
Ramganga Vihar Phase – II, Moradabad

ACADEMIC CALENDAR

ODD Semester			2017 – 2018 Session
S. No.	Particulars	Date	Responsibility
1.	**Time Table** (a) Display on Notice Boards (b) Distribution to concerned Teachers	01 Aug.2017 01 Aug 2017	O.C. Time – Table
2.	Distribution of class lists to teachers	02 Aug 2017	O.C. Class II / DR
3.	**Registrations** - (a) $5^{th} / 3^{rd} / 7^{th}$ (Sem.) (b)List of unregistered students to various department (c) Notifying unregistered students for getting registered at the earliest (through class O.Cs, II/ Faculty)	1,2,3 Aug,2017 20th Aug 2017 22 Aug 2017	Concerned Teachers OS Academic Concerned HODs
4.	**Commencement of Classes** $5^{th} / 3^{rd} / 7^{th}$ (Sem.)	2,3,4 Aug,2017	Concerned Teachers
5.	Blow up Submission to HODs	01 Aug 2017	Concerned Teachers
6.	Announcement of Test series dates	16Aug 2017	Dean Academics
7.	(a) Collection Exam. Forms from University and Announcement of date for availability of forms (b) Last date for submission of forms to office. (c) Submission of forms to University.	31 Aug 2017**	OS Academic to take timely action as per University directions.
8.	Procurement of Stationary & materials for Test Series for full Semester (a) Requirement (b) Actual Procurement	31 Aug 2017 5 Sept2017	Convener Test Series Committee O.S. Academics
9.	Short attendance compilation and information to parents	23 Sept 2017	O.C. Class I
10.	1st Test Series Tue, Wed, Thu	26,27,28 Sept 2017	
	(a) Announcement of Test Series schedule, Invigilation Programme, Seating arrangement, etc.	23 Sept 2017	Class Test Committee
	(b) After completion of Test Series- Evaluation of test copies & Showing of copies to students.	05 Oct 2017	Concerned Teacher
	(c) Submission of Test copies in Nodal Centre.	6 Oct 2017	Concerned Teacher
	(d) Report of poor performance of students to class OCs-I.	8 Oct 2017	Concerned Teacher
	(e)Short attendance compilation / information to parents and undertaking format handed over to students	13 Oct 2017	O.C. Class – I
	(f)Collection of Short attendance Undertaking	16 Oct 2017	
11.	2nd Test Series Sat, Mon, Tue	28,30, 31 Oct 2017	
	(a) Announcement of Test Series schedule, Invigilation Programme, Seating arrangement etc	25 Oct 2017	Class Test Committee
	(b) After completion of Test Series - Evaluation of test copies & Showing of copies to students,	7 Nov 2017	Concerned Teacher
	(c) Submission of copies in Nodal Centre.	8 Nov 2017	Concerned Teacher
	(d) Report of poor performance of students to class OCs-I.	9 Nov 2017	Concerned Teacher
12.	Filling of student feedback forms for current Semester	13 Nov 2017	Concerned HODs
13.	Requirement of additional Faculty (to be conveyed to Director) (for odd semester)	20 Nov 2017	Concerned HODs
14.	(a) Finalizing the Electives for Even Sem. [2017– 18] (b)Last date for students choice	20 Nov 2017 25 Nov 2017	Concerned HODs
15.	Announcement of Dues List and its Last date for clearing Dues (Current semester & next semester)	6 Oct 2017	Accounts/ OS Academic

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16.	Date up to which final attendance is to be counted	25 Nov 2017	
17.	Submission of consolidated list of shortage of attendance to Director and information to Parents	27 Nov 2017	Class O.Cs.-I
18.	3rd Test Series Thu, Fri, Sat	28, 29, 30 Nov 2017	
	(a) Announcement of Test Series schedule, Invigilation Programme, Seating arrangement etc.	24 Nov 2017	Class Test Committee
	(b) After completion of Test Series- Evaluation of test copies & Showing of copies to students,	5 Dec 2017	Concerned Teacher
	(c) Submission of copies in Nodal Centre.	6 Dec 2017	Concerned Teacher
	(d) Report of poor performance of students to class OCs-I.	7 Dec 2017	Concerned Teacher
19.	**Submission of Sessional marks:**		
	(a) Meeting of Dean Acd, , all HODs, Director and Director General regarding attendance and performance of students.	7 Dec 2017	Dean Academics
	(b) Checking of Teachers Records by HODs	11 Dec 2017	Concerned Teacher
	(c) Finalization of sectional marks	15 Dec 2017	Concerned Teacher
	(d) Submission of Award list (on roll List provided by OS Academic) after correction, if any to HODs	As per date announced by university AKTU	Concerned Teacher
	e) Submission of Award list after final checking and uploading to OS Academic for further necessary action.		HODs
20.	**Theory Examinations:** (a) Collection of Admit Cards / Roll Nos. From University (b) Preparation Roll Lists (c) Collection of Stationery such as copies, Practical copies . Drawing Sheets, Graph paper etc. from University. (c) Procurement of stationery and other materials locally as necessary.	AS PER AKTU SCHEDULE	OS Academics to take appropriate actions as per University directions.
21.	**Practical Examinations:**	AS PER AKTU SCHEDULE	Concerned HODs
	(a) Appointment of Internal Examiners	3 days before the practical exam schedule	Concerned HODs
	(b) Obtaining List of Panel of External Examiners from AKTU & Preparation of Schedule of Practical Examination.	AS PER AKTU SCHEDULE	OS Academics
	(d) Dispatch of letters/contacting the external examiner	Within 2 days of list obtained from AKTU	Practical Exam
22.	**Preparation for Odd Semester**		
	(a) Load Distribution by Department	10 Dec 2017	Concerned Coordinators O.C. Time Table
	(b) Submission to O.C. Time-Table	12 Dec 2017	
	(c) Display of Time Table on Notice Board	10 Jan 2017	
23.	Registration for Even semester [2017 – 18]	To be announced**	OS Academic
24.	Announcement of Academic calendar for Even semester [2017 – 18]	5 Days before the start of Even sem.	Dean Academics

**May be revised as per AKTU Schedule.

Dean Academics

Director 27|9|17

Copy to:

1.	Chairman	2.	Secretary	3.	P.A. to Director for Director's folder
4.	All HODs	5.	DOSW	6.	Controller Examination
7.	Associate Dean Academics	8.	Registrar	9.	All Faculty Members through HODs
10.	O.S. Academics	11.	A.S. Examinations	12.	Accounts Section
13.	T & P Cell	14.	Librarian	15.	Convener Test Series/ O.C. Time Table

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MORADABAD INSTITUTE OF TECHNOLOGY, MORADABAD
Ram Ganga Vihar Phase-II Moradabad (U.P.)
Approved by AICTE and Affiliated to Dr. A. P. J. Abdul Kalam Technical University, Lucknow

Website: http://mitmoradabad.edu.in

Department Academic Calendar, Odd Semester, Session (2017 – 2018)

VISION	MISSION
A center of excellence in the field of computer science and engineering producing quality graduates as globally recognized professionals in industry and research organizations.	To transform the department into one of the leading computer science and engineering departments of the country with aim of producing globally recognized engineering graduates who are not only job seekers but also the entrepreneurs and are also aware about their responsibilities towards nation with high professional and ethical values.

July-2017

Su	M	T	W	Th	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

August-2017

Su	M	T	W	Th	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September-2017

Su	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October-2017

Su	M	T	W	Th	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November-2017

Su	M	T	W	Th	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December-2017

Su	M	T	W	Th	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

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| | | | | | | | | | 31 | | | | |

Code	Description	Code	Description	Code	Description
A	Time Table Display on Notice Boards	R	1st Test Series	AI	3rd Test Series
B	Blow Up Submission to HODs	S	Maha Navmi	AJ	Id-e-Milad
C	3rd /5th /7th semester registration	T	Dussehra	AK	Load distribution by Department
D	Commencement of Classes of 3rd /5th /7th semester	U	Gandhi Jayanti	AL	Christmas Day
E	Raksha Bandhan	V	Maharishi Valmiki Jayanti	AM	FDP on Python
F	Independence day / Janmashtami	W	Submission of Test copies in Nodal Center		
G	Event "Logo Pogo " organized by CSSS	X	Event "Act-o-holic" organized by CSSS		
H	Id ul Zuha	Y	Mid Semester Break (Deepawali)		
I	Expert Lecture on "Ethical Hacking" by Mr. Brijesh Pandey, CEO, Cyber Security Analyst, CyberNaut New Delhi	Z	Expert Lecture on "Data Analytics" by Mr. Mohit Joshi, Advisory Software Engineer ,PITNEY BOWES Pune		
J	Expert Lecture on "How to Prepare for various MNCs during Graduation " by Mr. Rachit Agrawal, Associate Account manager, Paytm Gurgaon	AA	2nd Test Series		
K	One day Workshop on Android App by Appic Vision Solutions Lucknow	AB	Expert Lecture on "Cyber Security" by Er. Rahul Mishra, Trainer / Ethical Hacker, Innovative Ideas Infotech Lucknow		
L	Expert Lecture on "Careers in Computer Science : Beyond conventional IT Consulting " by Mr. Divya Prakash Aneja, Manager Program Management Sapient Gurgaon	AC	Two days Workshop on Cyber Security by Innovative Idea info Tech		
M	Event "Ovnhas" organized by CSSS	AD	Guru Nanak Birthday / Kartik Poonima		
N	Expert Lecture on "Android App Development & Cross Application Through Xamarin" by Mr. Anuj Jauhari CEO, Appic Vision Solution, Kashipur	AE	Filling of Student Feedback form for current Semester		
O	Expert Lecture on "Data Analysis by R Programming" by Ms. Payal Yadav Asst. Prof. IET Lucknow	AF	Event "Bachpan Reloaded" organized by CSSS		
P	One day Workshop on R Programming by AMLED Pvt Ltd	AG	Floating of Electives for Even Semester		
Q	Short Attendance compilation and information to parents	AH	Submission of consolidated list of shortage of attendance to director and information to parents		

Month	Dates of Teaching Days (2nd ,3rd & 4th Year)	No. of Teaching Days	No. of Lecture Hours
Jul-17	--	NA	
Aug-17	2,3,4,5,8,9,10,11,12,14,16,17,18,19,21,22,23,24,25,26,28,29,30,31	24	
Sep-17	1,4,5,6,7,8,9,11,12,13,14,15,16,18,19,20,21,22,23,25	20	92*7= 644
Oct-17	3,4,6,7,9,10,11,12,13,14,16,17,23,24,25,26,27	17	
Nov-17	1,2,3,6,7,8,9,10,11,13,14,15,16,17,18,20,21,22,23,24,25,27	22	
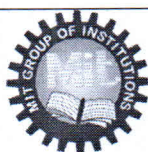
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Dr.A.P.J.Abdulkalam Technical University, UttarPardesh,Lucknow
(Formerly Uttar Pradesh Technical University)
STUDY EVALUATION SCHEME
B. TECH. COMPUTER SCIENCE & ENGINEERING
YEAR forth, SEMESTER –VII
(Effective from the session: 2016-17)

S.No.	Subject Code	Subject	Period	Evaluation Scheme				Total	Credit
				Sessional			Exam		
				CT	TA	Total			
1		Open Elective I	3-1-0	30	20	50	100	150	4
2	NCS-701	Distributed System	3-1-0	30	20	50	100	150	4
3	NCS-702	Artificial Intelligence	3-1-0	30	20	50	100	150	4
4		Departmental Elective III	3-1-0	30	20	50	100	150	4
5		Departmental Elective IV	3-1-0	30	20	50	100	150	4
Practical / Training /Projects									
6	NCS-751	Distributed System *	0-0-2	-	20	20	30	50	1
7	NCS-752	Project	0-0-6	-	100	100	-	100	3
8	NCS-753	Industrial Training	0-0-2	-	50	50	-	50	1
9	GP-701	General Proficiency	-	-	-	-	-	50	
		Total	15-5-10					1000	25

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ARTIFICIAL INTELLIGENCE (NCS-702)

Unit I
Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.

Unit II
Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning

Unit III
Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit IV
Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.

Unit V
Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

Text books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

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Artificial Intelligence NCS-702

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Syllabus

ARTIFICIAL INTELLIGENCE (NCS-702)

Unit I

Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence,
Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.
Beyond: Aspects of Robotics

Unit II

Review: Basics of Search Algorithms and Data Structures
Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems
Adversarial Search, Search for games, Alpha - Beta pruning
Beyond: Hill-Climbing Search

Unit III

Review: Basics of Discrete Mathematics
Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic,
Bridging: Markov Models
Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit IV

Review: Basics of Data and Information Processing
Machine Learning: Supervised and unsupervised learning, Decision trees,
Bridging: Component of Machine Learning
Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.
Beyond: Tools for Machine Learning

Unit V

Review: Data and information processing
Pattern Recognition: Introduction, Design principles of pattern recognition system, Statistical Pattern recognition,
Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.
Beyond: r-Nearest neighbors clustering
Text books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
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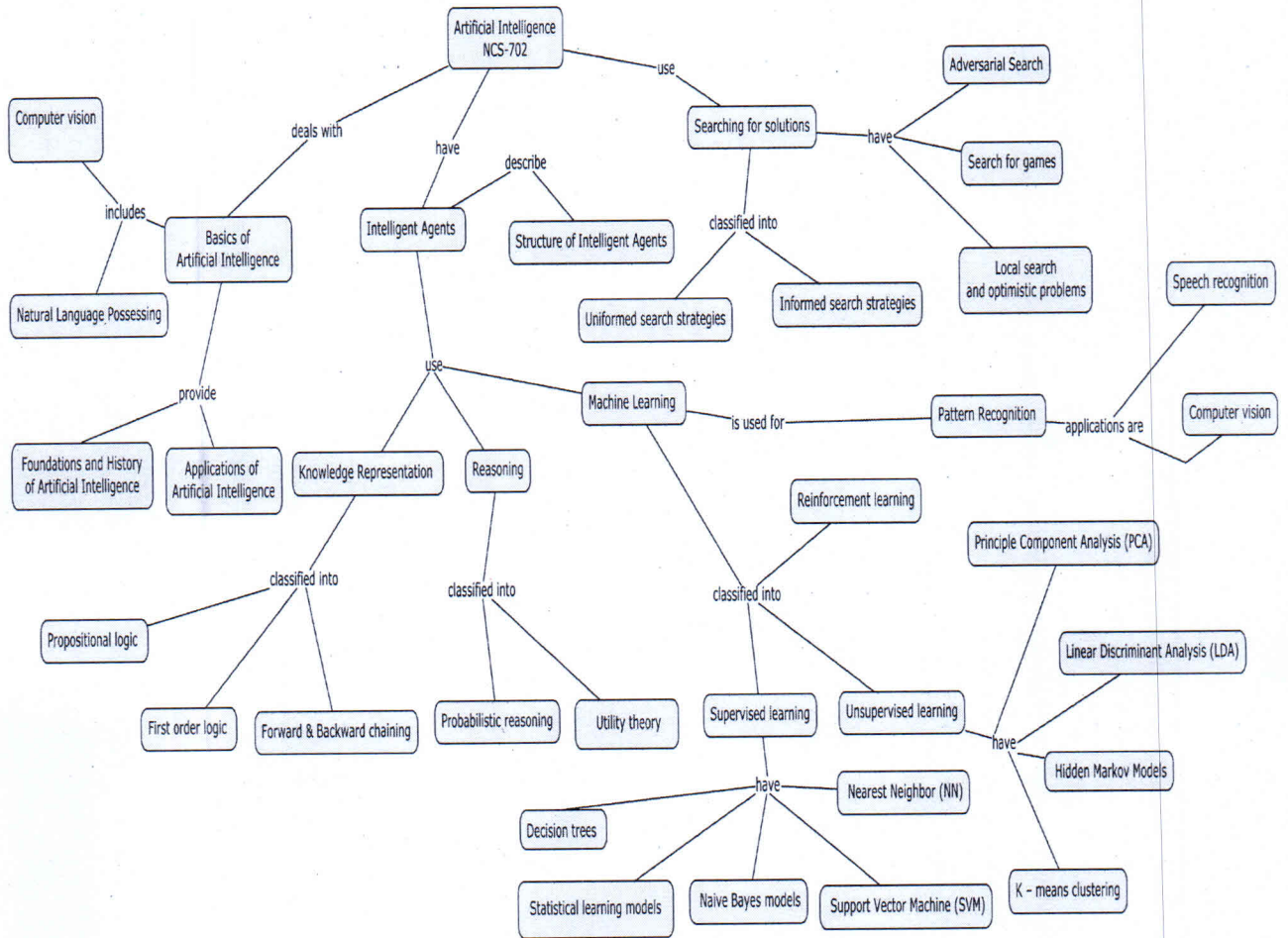
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Course Objectives

The objective of the course is:

- To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents, Search, Knowledge representation, inference, logic, and learning.
- To understand the basic concept of machine learning and pattern recognition.

Course Outcomes

Upon successful completion of this course student will be able :

1. To explain the fundamental concepts of artificial intelligence (AI) and intelligent agent
2. To apply the AI uniformed and informed search techniques
3. To use the propositional logic, first order logic, reasoning and Bayesian Networks
4. To apply supervised and unsupervised learning using Naïve Bayes and EM Algorithms
5. To demonstrate the principles of pattern recognition and apply SVM, NN, and K-means clustering

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	Course Delivery Method	SESSION-2017-2018
		SEM- VII

In Pursuit of Excellence

Name of Subject: Artificial Intelligence

Subject Code: NCS 702

Branch: Computer Science & Engineering

Course Plan

Delivery Methods: Chalk & Talk, Power Point Presentation, Tutorials, Video Lectures, Numerical

Coverage of
 Unit 1 by: - Chalk & Talk, Power Point Presentation. Tutorials and assignments
 Unit 2 by: - Chalk & Talk, Power Point Presentation, Tutorials and assignments
 Unit 3 by: - Chalk & Talk, Power Point Presentation Tutorials and assignments
 Unit 4 by: - Chalk & Talk, Power Point Presentation Tutorials and assignments
 Unit 5 by: - Chalk & Talk, Power Point Presentation Tutorials and assignments

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Mapping of Course Outcomes with POs & PSOs:

Course Code	CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
NCS702	CO1	NCS702.1	2	1			1	2						
	CO2	NCS702.2	2	2	1		2	2						
	CO3	NCS702.3	3	2	2	3	2	2						
	CO4	NCS702.4	3	2	2	1	2	2						
	CO5	NCS702.5	3	2	2	1	2	2						
Mapping Strength		NCS702	2.6	1.8	1.75	1.7	1.8	2						

*3= High   *2= Medium   *1=Low

Upon successful completion of this course student will be able :

CO1	To express fundamental concepts of Intelligent agent,Computer Vision and Natural language processing
CO2	To determine solutions for water jug problem using informed search ,uninformed search.
CO3	To articulate propositional logis,First order predicate logic
CO4	To differentiate between supervised and unsupervised learning technique
CO5	To interpret pattern recognition using parameter estimation methods, classification techniques

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Time Table

In Pursuit of Excellence

MORADABAD INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

FACULTY: MS. KANCHAN(KN)

FACULTY TIME TABLE 2017-18 (ODD SEM)

w.e.f: 14/09/2017

L	T	P	TOTAL
3	3	14	20

TIME / DAY	9:00 AM - 10:00 AM	10:00 AM - 11:00 AM	11:00 AM - 12:00 NOON	12:00 AM - 1:00 PM	1:00 PM - 2:00 PM	2:00 PM - 3:00 PM	3:00 PM - 4:00 PM	4:00 PM - 5:00 PM
MONDAY	NCS-702(L) 7th B B-120		RCS-354 3rd B2 B-113			PPP 7th B D-304		
TUESDAY		NCS-702(L) 7th B B-120	NCS-753 7th C3 B-120				NCS-753 7th D2 B-120	
WEDNESDAY		NCS-702(T) 7th B3 B-113	RCS-354 3rd A1 B-113		L U N C H		NCS-702(T) 7th B1 B-316	
THURSDAY			NCS-753 7th B3 B-120			NCS-702(L) 7th B B-120		NCS-752 PROJECT GUIDE
FRIDAY	RCS-354 3rd A2 B-113		NCS-702(T) 7th B2 B-114					NCS-752 PROJECT GUIDE
SATURDAY								

SUB. CODE	SUBJECT NAME
NCS-702	Artificial Intelligence
NCS-753	Industrial Training
RCS-354	Data Structures Using C/Java Lab

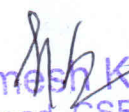Kanchan- Deptt. OC

Mr. Rakesh Gangwar – OC Time Table

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Moradabad-244001

						SESSION-2017-2018		

	Lecture Plan & Course Coverage	SESSION-2017-2018
In Pursuit of Excellence		SEM-VII

Total Period: 45

Sr. No.	No. of Periods	Topics/Sub Topics	Reference Books	CO Covered	Planned Date	Coverage Date	Sign
UNIT-I: Introduction						
1.	1	Introduction to Artificial Intelligence		CO-1	7-8-17	8-8-17	
2.	1	Foundations and History of Artificial Intelligence		CO-1	8-8-17	9-8-17	
3.	1	Applications of Artificial Intelligence		CO-1	9-8-17	10-8-17	
4.	1	Intelligent Agents	1,2	CO-1	10-8-17	14-8-17	
5.	1	Structure of Intelligent Agents		CO-1	14-8-17	17-8-17	
6.	1	Computer vision		CO-1	15-8-17	21-8-17	
7.	1	Natural Language Possessing.		CO-1	16-8-17	22-8-17	
8.	1	Robotics (Beyond)		CO-1	17-8-17	23-8-17	
UNIT-II: Introduction to Search						
9.	1	Searching for solutions		CO-2	21-8-17	24-8-17 28-8-17	
10.	1	Uniformed search strategies		CO-2	22-8-17	29-8-17	
11.	1	Informed search strategies		CO-2	23-8-17	30-8-17	
12.	2	Local search algorithms and optimistic problems	1,2	CO-2	24-8-17	31-8-17 4-9-17	
13.	1	Adversarial Search		CO-2	28-8-17	5-9-17	
14	1	Search for games		CO-2	29-8-17	7-9-17	
15	2	Alpha - Beta pruning		CO-2	30-8-17	11-9-17 12-9-17	
16	1	**Hill-Climbing Search (Beyond)**		CO-2	31-8-17 4-9-17	19-19-17	
UNIT-III: Knowledge Representation & Reasoning						
17	1	Propositional logic		CO-3	5-9-17	3-10-17	
18	1	Theory of first order logic		CO-3	6-9-17	9-10-17	
19	1	Inference in First order logic		CO-3	7-9-17	10-10-17 12-10-17	
20	1	Forward & Backward chaining	1,2,3	CO-3	11-9-17	25-10-17	
21	1	Resolution		CO-3	12-9-17	01-11-17	
22	1	Probabilistic reasoning, Utility theory		CO-3	13-9-17	6-11-17	
23	1	Hidden Markov Models (HMM)		CO-3	14-9-17	7-11-17	

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24	1	Bayesian Networks		CO-3	18-9-17	9-11-17	du

UNIT-IV: Machine Learning

25	1	Supervised and unsupervised learning		CO-4	19-9-17	13-11-17	du
26	1	Decision trees		CO-4	20-9-17	13-11-17	du
27	1	Statistical learning models		CO-4	21-9-17	14-11-17 15-11-17	du
28	2	Learning with complete data - Naive Bayes models	1,2,3,4	CO-4	25-9-17 26-9-17	15-11-17 20-11-17	du
29	2	Learning with hidden data – EM algorithm		CO-4	27-9-17 28-9-17	20-11-17	du
30	1	Reinforcement learning		CO-4	3-10-17	21-11-17	du
31	1	**Nearest neighbors clustering (Beyond)**		CO-4	4-10-17	21-11-17	du

UNIT-V: Pattern Recognition

32	1	Introduction,		CO-5	9-10-17	22-11-17	du
33	1	Design principles of pattern recognition system		CO-5	10-10-17	22-11-17	du
34	1	Statistical Pattern recognition		CO-5	12-10-17	23-11-17	du
35	1	Parameter estimation methods - Principle Component Analysis (PCA)		CO-5	23-10-17	23-11-17 24-11-17	du
36	1	Linear Discriminant Analysis (LDA)	1,2,4	CO-5	1-11-17	24-11-17	du
37	1	Classification Techniques – Nearest Neighbor (NN) Rule		CO-5	2-11-17	24-11-17	du
38	1	Bayes Classifier		CO-5	6-11-17	27-11-17	du
39	1	Support Vector Machine (SVM)		CO-5	7-11-17	27-11-17	du
40	1	K – means clustering		CO-5	8-11-17	27-11-17	du
41	1	**Genetic Algorithm (Beyond)**		CO-5	9-11-17	27-11-17	du

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill
3. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
4. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

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Sign. of Reviewer

Sign. of HOD

23

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1. Define Artificial Intelligence. List the fields that form the basis for AI.

2. What is a Knowledge Based System? Explain.

3. What is an AI technique? Give some examples of problems to explain AI techniques. Why do we need to model human performance in AI?

4. List a few of the task domains of AI.

5. Describe the components of a Knowledge Based System.

6. What id meta-knowledge?

7. What do you mean by Natural Language Processing?

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CO-2

1. What is search? List the steps in performing a state-space search.

2. Differentiate Informed & Uninformed search. Give examples.

3. Explain the logic behind – Hill climbing, Best-First Search, BFS and DFS.

4. What do you mean by Game Playing? Explain the components of Game software?

5. Define alpha & beta values in a game tree.

6. Explain Alpha-beta pruning with algorithm and an example.

7. Discuss Game playing as a challenging area of AI.

8. Define minimax value with regards to optimal decision in games.

9. Solve the following CSP problem of cryptarithmetic

```
      C R O S S
  +   R O A D S
  ===============
    D A N G E R
  ===============
    D A N G E R
```

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CO-3

1. Differentiate prepositional & predicate logic.

2. Define a well-formed formula (wff).List some of the rules of inference.

3. What is resolution /refutation? Explain unification with example.

4. What are semantic nets? Explain frames with sutable example? How do they differ from semantic nets.

5. What is Resolution principle? Discuss the algorithm for propositional resolution with an example.

6. Consider the following sentences :

   . John likes all kinds of food

   . Apples are food

   . Chicken is food

   . Anything anyone eats and isn't killed by is food

   . Bill eats peanuts and is still alive

   . Sue eats everything Bill eats.

   i)   Translate these sentences into formulas in predicate logic

   ii)   Convert the formulas of part a into clause form.

7. Briefly Explain

   i. Define Unification.

   ii. What is Modus Ponens rule? Give an example to show how it works.

8. What do you mean by uncertainty? Why uncertainty arises?

9. Explain with an example
   (a) Forward chaining (8) (b) Backward chaining (8)

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CO-4

1. Write the general form of Bayes' theorem.

2. What is an Expert system? Discuss the components and architecture of an expert system.

3. 1) What are the components of agents? Explain with example.

4. Write short notes on following:

   a) Supervised learning

   b) Unsupervised learning

   c) Reinforcement learning)

5. What is a decision tree? Explain the process of inducing decision trees from examples.

6. Write the decision tree learning algorithm.

7. How the performance of a learning algorithm is assessed? Draw a learning curve for the decision tree algorithm.

8. How hypotheses formed by pure inductive inference or induction? Explain with examples.

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1. What is pattern recognition? Explain the difference between statistical and structural approaches?

2. Explain Bayes theorm.with example.

3. What is random variable? What is parametric estimation method?

4. .What is difference between maximum likely hood and bayes method.

5. Explain feature extraction.

6. Write down properties of expectation-maximization algorithm.

7. What is clustering? Give criterion function of clustering.

8. Give various important clustering algorithms.

9. Write short note on divise and agglomerative clustering

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CO-1

Q1. What is Agent Program? Discuss the type of Agent Program?

Q2 What is Intelligent Agent and dicuss in brief?

Q3. Discuss in details types of Intelligent Agent? With example?

Q4. Describe the difference between Language Understanding and Language Generation with suitable example?

Q5. Explain how Conventional Computing differs from the Intelligence Computing?Differentiate between Strong AI and Weak AI.

Q6. Define Artificial Intelligence in terms of rational acting.

Q7. Describe the role of artificial intelligence in natural language processing.

Q8. Define Artificial Intelligence in terms of rational thinking.

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CO-2

Q1.compare BFS with DFS with example.

Q2.Discuss and compare hill climbing and best first sarch technologies.

Q3.Explain AO* with example.

Q4.give an instance of TSP for which the nearest neibour strategy fails to find an optimal path.C

Q5.Explain mean end analysis algorithm.

Q6.Discuss alpha beta pruning.with example? compare informed and uninformed search.

Q7.when will hill climbing search technique fail?do steepest ascent climbing always find solutions

Q8.List all the local serach algorithms.

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CO-3

Q1. Differentiate between Forward and Backward Chaining system.

Q2. Define Resolution. What is the basic of Resolution?

Q3. Represent the following sentence into first order logic (FOL).
   (a) Lipton is a tea
   (b) Lata is a child who drinks tea
   (c) Ruma dislikes children who drink tea
   (d) Ruma dislikes Lata

Q4. Explain Horn Clause. What is the procedure of clausal conversion with example?

Q5. Draw a hierarchical network to represent the information. "Mouse is a rodent; rodent is a mammal; A mammal has color and also drinks water".

Q6. What is Hidden Markov Model (HMM).C

Q7. Represent following sentences in predicate logic:
   (a) All students like good teachers.
   (b) All that glitters is not gold
   (c) Fruits and vegetables are delicious

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Q1. What is learning? Explain the important components of Learning.

Q2. Explain is learning.explain all types of learning.

Q3. Difference between Supervised and Unsupervised Learning?

Q4. Explain Decision Tree Learning. How can we express Decision Trees?

Q5. Explain the term Reinforcement learning?

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Q1. Define and describe the difference between knowledge belief, hypothesis and data.

Q2. What are the different classification techniques?name them.

Q3. Write the algorithm for bayes classifier?

Q4. Write short notes on:
      Nearest neibour technique
      Support Vector Machines

Q5.Explain linear discriminant analysis?

Q6. Discuss the LDA parameter estimation method. Give the difference between PCA and LDA.

Q7 Explain the Nearest Neighbour Rule in Pattern Recognition.

Q8. Explain the Nearest Neighbour cluster algorithm.

Q9. What do you understand by Support Vector Machine (SVM)?

Q10. Explain K-means clustering

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In Pursuit of Excellence

Computer Science & Engineering

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17.	1410156	1408210019	AMIT MAURYA	
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20.	1410427	1408210022	ANANYA BHATNAGAR	
21.	1410712	1408210023	ANCHIT GUPTA	
22.	1410389	1408210024	ANJALI PARMAR	
23.	1410497	1408210025	ANKIT KUMAR	
24.	1410520	1408210026	ANKUR VARSHNEY	
25.	1410211	1408210027	ANSHIKA PANDEY	
26.	1410114	1408210028	ANUKRITI AGARWAL	
27.	1410215	1408210029	ANUSHREE GUPTA	
28.	1410261	1408210030	APOORV MEHROTRA	
29.	1410516	1408210031	APOORV SHARMA	
30.	1410382	1408210033	ARJUN SINGH	
31.	1410377	1408210034	ARPAN SINGH	
32.	1410643	1408210035	ARPITA ARORA	
33.	1410557	1408210036	ASHUTOSH	
34.	1410496	1408210037	ASHWANI KUMAR	
35.	1410523	1408210038	AVIRAL VISHNOI	
36.	1410686	1408210039	AVNEESH KAUSHIK	
37.	1410172	1408210040	AYUSH KR GUPTA	
38.	1410192	1408210041	AYUSH VERMA	
39.	1410219	1408210042	AYUSHI RASTOGI	
40.	1410239	1408210043	BHAWNA SHARMA	
41.	1410610	1408210044	CHETAN KUMAR	

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43.	1410379	1408210046	DEEPA GUSAIN	
44.	1410087	1408210047	DEEPIKA MATHUR	
45.	1410218	1408210048	DEVANGNA RASTOGI	
46.	1410491	1408210049	DHARMENDRA SINGH	**FW**
47.	1410551	1408210050	DIKSHA PUSHPAK	
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51.	1410532	1408210058	HARSHIT GOEL	**FW**
52.	1410003	1408210059	HIMANSHI GUPTA	
53.	1410285	1408210060	HIMANSHU BHATNAGAR	
54.	1410175	1408210061	IKRA	
55.	1410608	1408210062	ISHIKA PANT	
56.	1410316	1408210063	JATIN GANDHI	
57.	1410335	1408210064	JEETESH RATHORE	
58.	1410543	1408210065	KANIKA JAIN	
59.	1410001	1408210066	KIRTI RAIZADA	

BATCH	S. NO.
B1	01 – 20
B2	21 – 42
B3	43-Rest

Dr Animesh Agarwal
Dean – Academics

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SHORT ATTENDENCE BEFORE CT -1

S.No	ROLL NO	STUDENT NAME	HELD	ATTEND	PERCENTAGE
1.	1408210005	ABHIJEET SEJWAL	12	25	48
2	1408210012	AFZAL AHMAD	14	25	56
3	1408210018	AMIT KUMAR	9	25	36
4	1408210022	ANANYA BHATNAGAR	11	25	44
5	1408210033	ARJUN SINGH	13	25	52
6	1408210042	AYUSHI RASTOGI	14	25	56
7	1408210044	CHETAN KUMAR	8	25	32
8	1408210059	HIMANSHI GUPTA	13	25	52
9	1408210062	ISHIKA PANT	14	25	56
10	1408210063	JATIN GANDHI	7	25	28

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MORADABAD INSTITUTE OF TECHNOLOGY
Class Test -1(2017-18)

Sub: Artificial Intelligence (NCS-702)   **Year/Sem: 4th /7th**   **Sec: B, C, And D   MM: 15**

Note: Attempt all questions. Each question carry 3 marks.

Q1.What is AI? Explain heuristic search and types with example? CO-1

Q2.What is intelligent agent? Discuss in brief the concept of learning based agent?CO-1

Q3.Differentiate between DFS and BFS write an algorithm for best first serach?CO-2

Q4. You have 2 jugs of water. One that holds 5 gallons and one that holds 3 gallons. How do you get exactly 4 gallons in one jug? Also give production rules for the problem.CO-2

Q5.Explain hill climbing algorithm? Describe the underestimate and overestimate condition for A* algorithm?CO-2
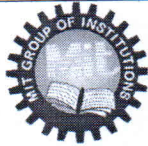
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Ans-1 Artificial intelligence is **the simulation of human intelligence processes by machines**, especially computer systems. Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision A Heuristic is a technique to solve a problem faster than classic methods, or to find an approximate solution when classic methods cannot. This is a kind of a shortcut as we often trade one of optimality, completeness, accuracy, or precision for speed. A Heuristic (or a heuristic function) takes a look at search algorithms. At each branching step, it evaluates the available information and makes a decision on which branch to follow.

a. Direct Heuristic Search

Other names for these are Blind Search, Uninformed Search, and Blind Control Strategy. These aren't always possible since they demand much time or memory.
They search the entire state space for a solution and use an arbitrary ordering of operations. Examples of these are Breadth First Search (BFS) and Depth First Search (DFS).
b. Weak Heuristic Search

Other names for these are Informed Search, Heuristic Search, and Heuristic Control Strategy. These are effective if applied correctly to the right types of tasks and usually demand domain-specific information.

Ans.2 An intelligent agent is a program that can make decisions or perform a service based on its environment, user input and experiences. These programs can be used to autonomously gather information on a regular, programmed schedule or when prompted by the user in real time. An intelligent agent (IA) is an entity that makes a decision, that enables artificial intelligence to be put into action. It can also be described as a software entity that conducts operations in the place of users or programs after sensing the environment. It uses actuators to initiate action in that environment
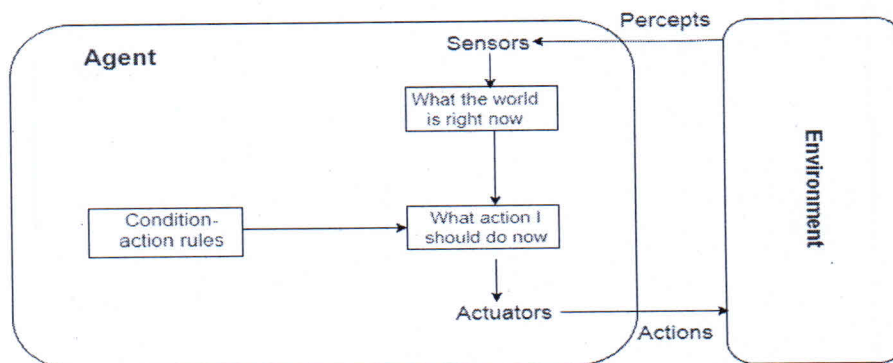
Ans-3 Following are the important differences between BFS and DFS.

Sr. No.	Key	BFS	DFS
1	Definition	BFS, stands for Breadth First Search.	DFS, stands for Depth First Search.
2	Data structure	BFS uses Queue to find the shortest path.	DFS uses Stack to find the shortest path.
3	Source	BFS is better when target is closer to Source.	DFS is better when target is far from source.
4	Suitablity for decision tree	As BFS considers all neighbour so it is not suitable for decision tree used in puzzle games.	DFS is more suitable for decision tree. As with one decision, we need to traverse further to augment the decision. If we reach the conclusion, we won.
5	Speed	BFS is slower than DFS.	DFS is faster than BFS.

Best First Search Algorithm

1. Create 2 empty lists: OPEN and CLOSED
2. Start from the initial node (say N) and put it in the 'ordered' OPEN list
3. Repeat the next steps until GOAL node is reached
   1. If OPEN list is empty, then EXIT the loop returning 'False'
   2. Select the first/top node (say N) in the OPEN list and move it to the CLOSED list. Also capture the information of the parent node
   3. If N is a GOAL node, then move the node to the Closed list and exit the loop returning 'True'. The solution can be found by backtracking the path
   4. If N is not the GOAL node, expand node N to generate the 'immediate' next nodes linked to node N and add all those to the OPEN list
   5. Reorder the nodes in the OPEN list in ascending order according to an evaluation function f(n)

This algorithm will traverse the shortest path first in the queue. The time complexity of the algorithm is given by **O(n*logn)** .

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Ans-4 Hill Climbing Algorithm in Artificial Intelligence

- o Hill climbing algorithm is a local search algorithm which continuously moves in the direction of increasing elevation/value to find the peak of the mountain or best solution to the problem. It terminates when it reaches a peak value where no neighbor has a higher value.

- o Hill climbing algorithm is a technique which is used for optimizing the mathematical problems. One of the widely discussed examples of Hill climbing algorithm is Traveling-salesman Problem in which we need to minimize the distance traveled by the salesman.

- o It is also called greedy local search as it only looks to its good immediate neighbor state and not beyond that.

- o A node of hill climbing algorithm has two components which are state and value.

- o Hill Climbing is mostly used when a good heuristic is available.

- o In this algorithm, we don't need to maintain and handle the search tree or graph as it only keeps a single current state.

When the estimate is higher than the actual value, it's called an overestimate. **When the estimate is lower than the actual value**, it's called an underestimate.

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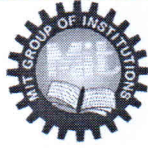
Attendance
Subject: Artificial Intelligence
Subject Code:NCS-702

S.No.	Roll No.	Name of Students	CT-1
1.	1408210001	AAKASH TRIPATHI	P
2.	1408210002	AANCHAL VERMA	P
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4.	1408210004	AAYUSHI AGARWAL	P
5.	1408210005	ABHIJEET SEJWAL	p
6.	1408210006	ABHINANDAN SRIVASTAVA	P
7.	1408210007	ABHISHEK	P
8.	1408210009	ABHISHEK KUMAR	A
9.	1408210010	ADITI SRIVASTAVA	P
10.	1408210011	ADITI TANDON	p
11.	1408210012	AFZAL AHMAD	p
12.	1408210014	AKHIL SRIVASTAVA	p
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15.	1408210017	AMBER SAXENA	P
16.	1408210018	AMIT KUMAR	A
17.	1408210019	AMIT MAURYA	P
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23.	1408210025	ANKIT KUMAR	A
24.	1408210026	ANKUR VARSHNEY	P
25.	1408210027	ANSHIKA PANDEY	P
26.	1408210028	ANUKRITI AGARWAL	P
27.	1408210029	ANUSHREE GUPTA	P
28.	1408210030	APOORV MEHROTRA	A
29.	1408210031	APOORV SHARMA	P
30.	1408210033	ARJUN SINGH	P
31.	1408210034	ARPAN SINGH	P
32.	1408210035	ARPITA ARORA	P
33.	1408210036	ASHUTOSH	P
34.	1408210037	ASHWANI KUMAR	P
35.	1408210038	AVIRAL VISHNOI	A
36.	1408210039	AVNEESH KAUSHIK	P
37.	1408210040	AYUSH KR GUPTA	P
38.	1408210041	AYUSH VERMA	P
39.	1408210042	AYUSHI RASTOGI	P
40.	1408210043	BHAWNA SHARMA	A
41.	1408210044	CHETAN KUMAR	P
42.	1408210045	DEEPA CHAUDHARY	P
43.	1408210046	DEEPA GUSAIN	P
44.	1408210047	DEEPIKA MATHUR	P
45.	1408210048	DEVANGNA RASTOGI	P
46.	1408210049	DHARMENDRA SINGH	P
47.	1408210050	DIKSHA PUSHPAK	P
48.	1408210054	EKANSHU BALYAN	P

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50.	1408210056	GOURA JAIN	P
51.	1408210058	HARSHIT GOEL	A
52.	1408210059	HIMANSHI GUPTA	P
53.	1408210060	HIMANSHU BHATNAGAR	P
54.	1408210061	IKRA	A
55.	1408210062	ISHIKA PANT	P
56.	1408210063	JATIN GANDHI	P
57.	1408210064	JEETESH RATHORE	P
58.	1408210065	KANIKA JAIN	P
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S.No.	University	Name of Students	Q1	Q2	Q3	Q4	Q5	Total
1	1408210001	AAKASH TRIPATHI	2.5	2.5	2.5	2.5	2.5	12.5
2	1408210002	AANCHAL VERMA	2	2	1.5	2.5	0	8
3	1408210003	AASHIKA KAUSHIK	3	3	2.5	2.5	3	14
4	1408210004	AAYUSHI AGARWAL	2.5	2.5	2.5	2.5	2.5	12.5
5	1408210005	ABHIJEET SEJWAL	2.5	2.5	2.5	2.5	1.5	11.5
6	1408210006	ABHINANDAN SRIVASTAVA	2.5	2.5	2.5	2.5	2.5	12.5
7	1408210007	ABHISHEK	1.5	0	1.5	0.5	0	3.5
8	1408210009	ABHISHEK KUMAR	2.5	2.5	2.5	2.5	1	11
9	1408210010	ADITI SRIVASTAVA	3.5	3.5	3.5	3.5	3	17
10	1408210011	ADITI TANDON	3	3	2.5	2.5	2.5	13.5
11	1408210012	AFZAL AHMAD	2.5	2.5	2.5	2.5	1	11
12	1408210014	AKHIL SRIVASTAVA	2.5	2.5	2.5	2.5	3	13
13	1408210015	AMAN GAUR	3	3	2.5	2.5	3	14
14	1408210016	AMAN RAJ	3	3	3	2.5	3	14.5
15	1408210017	AMBER SAXENA	3	3	3	3	3	15
16	1408210018	AMIT KUMAR						0
17	1408210019	AMIT MAURYA	2.5	2.5	2.5	2.5	1.5	11.5
18	1408210020	ANAMIKA SHARMA	2.5	2.5	2.5	2.5	2	12
19	1408210021	ANAND YADAV	2.5	2.5	2.5	2.5	2	12
20	1408210022	ANANYA BHATNAGAR						0
21	1408210023	ANCHIT GUPTA	1	0	2.5	2	0	5.5
22	1408210024	ANJALI PARMAR	3	3	3	3	3	15
23	1408210025	ANKIT KUMAR						0
24	1408210026	ANKUR VARSHNEY	3.5	3.5	3.5	3.5	3.5	17.5
25	1408210027	ANSHIKA PANDEY	2.5	2.5	2.5	2.5	2.5	12.5
26	1408210028	ANUKRITI AGARWAL	3	3	3	3	3	15
27	1408210029	ANUSHREE GUPTA	3	3	3	2.5	2.5	14
28	1408210030	APOORV MEHROTRA	2.5	3	2.5	2.5	3	13.5
29	1408210031	APOORV SHARMA	2.5	2.5	2.5	2.5	1.5	11.5
30	1408210033	ARJUN SINGH	2.5	2.5	2.5	2.5		10
31	1408210034	ARPAN SINGH	0	0	0			0
32	1408210035	ARPITA ARORA	2.5	2.5	2.5	2.5	2.5	12.5
33	1408210036	ASHUTOSH	0	0	0.5			0.5
34	1408210037	ASHWANI KUMAR	2.5	2.5	2.5	2.5	3	13

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35	1408210038	AVIRAL VISHNOI	2.5	2.5	2.5	2.5	2.5	12.5
36	1408210039	AVNEESH KAUSHIK	2	1.5	1.5	1	3	9
37	1408210040	AYUSH KR GUPTA	0	0	1.5	0	0	1.5
38	1408210041	AYUSH VERMA	1	0	1.5	1.5	1	5
39	1408210042	AYUSHI RASTOGI	1	0	1	1.5	2	5.5
40	1408210043	BHAWNA SHARMA	2.5	2.5	2.5	2.5	3	13
41	1408210044	CHETAN KUMAR	2.5	2.5	2.5	1.5		9
42	1408210045	DEEPA CHAUDHARY	2.5	1	1.5	1	0	6
43	1408210046	DEEPA GUSAIN	2	2.5	1.5	1.5	1.5	9
44	1408210047	DEEPIKA MATHUR	1.5		2.5	2.5	1	7.5
45	1408210048	DEVANGNA RASTOGI	2.5	3	2.5	2.5	2.5	13
46	1408210049	DHARMENDRA SINGH	3	3	3	2.5	3	14.5
47	1408210050	DIKSHA PUSHPAK	2.5	2.5	2.5	2.5	3	13
48	1408210054	EKANSHU BALYAN	2.5	2.5	2.5	3	1.5	12
49	1408210055	GARIMA AGARWAL	2.5	2.5	2.5	3	2.5	13
50	1408210056	GOURA JAIN	2.5	2.5	2.5	2.5	2.5	12.5
51	1408210058	HARSHIT GOEL	2.5	2.5	2.5	2.5	2.5	12.5
52	1408210059	HIMANSHI GUPTA	2.5	2.5	2.5	2.5	2	12
53	1408210060	HIMANSHU BHATNAGAR	2.5	3	2.5	2.5	2.5	13
54	1408210061	IKRA	2.5	2.5	2.5	2.5	3	13
55	1408210062	ISHIKA PANT	2.5	2.5	2.5	3	2.5	13
56	1408210063	JATIN GANDHI	2.5	2.5	2.5	2.5	3	13
57	1408210064	JEETESH RATHORE	3	3	3	3	3	15
58	1408210065	KANIKA JAIN	2.5	2.5	2.5	2.5	2	12
59	1408210066	KIRTI RAIZADA	2.5	2.5	2.5	2.5	2.5	12.5

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BRIGHT STUDENT LIST

S.NO	Roll no	student name	Total Marks
1	1408210002	AANCHAL VERMA	10
2	1408210004	AAYUSHI AGARWAL	10
3	1408210010	ADITI SRIVASTAVA	9.5
4	1408210016	AMAN RAJ	9
5	1408210019	AMIT MAURYA	9
6	1408210021	ANAND YADAV	10
7	1408210022	ANANYA BHATNAGAR	9.5
8	1408210026	ANKUR VARSHNEY	9.5
9	1408210027	ANSHIKA PANDEY	8.5
10	1408210029	ANUSHREE GUPTA	9
11	1408210031	APOORV SHARMA	9
12	1408210033	ARJUN SINGH	10
13	1408210035	ARPITA ARORA	10
14	1408210039	AVNEESH KAUSHIK	10
15	1408210040	AYUSH KR GUPTA	9
16	1408210041	AYUSH VERMA	9
17	1408210042	AYUSHI RASTOGI	10
18	1408210048	DEVANGNA RASTOGI	9
19	1408210050	DIKSHA PUSHPAK	9.5
20	1408210054	EKANSHU BALYAN	8.5
21	1408210058	HARSHIT GOEL	10
22	1408210059	HIMANSHI GUPTA	10
23	1408210063	JATIN GANDHI	10
24	1408210065	KANIKA JAIN	10
25	1408210066	KIRTI RAIZADA	9

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Action Taken for Bright Students

1. Discussing Question based on previous year Question paper.
2. Providing Assignment Sheet
3. Ask some challenging questions during lecture for brainstorming.

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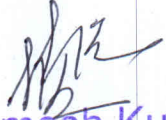
Dr. So
Prof. & H
Moradabad of Technology
Moradabad-244001

1. What is Artificial Intelligence? Discuss its importance.   [CO1]

2. Answer the following in brief:

   A. Explain the Water Jug problem.   [CO2]

   B. Discuss Turing test.   [CO1]

3. What do you mean by Natural Language Processing?   [CO1]

4. Define and distinguish between uninformed search and informed search. Explain the advantages and disadvantages of each.   [CO2]

1. What is A* search? Explain various stages of A* search with an example.   [CO2]

2. Explain Alpha-beta pruning with algorithm and an example.   [CO2]

3. Discuss Game playing as a challenging area of AI.   [CO2]

4. Define minimax value with regards to optimal decision in games   [CO2]

5. What are the desired characteristics of a knowledge representation scheme? Explain the various issues in knowledge representation.   [CO3]

6. Define logic and list the types of logic?   [CO3]

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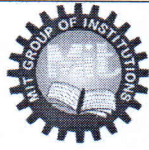
WEAK STUDENT LIST

S.No	Roll No	Student name	Total Marks
1	1408210001	AAKASH TRIPATHI	3
2	1408210003	AASHIKA KAUSHIK	5
3	1408210006	ABHINANDAN SRIVASTAVA	3
4	1408210007	ABHISHEK	1
5	1408210011	ADITI TANDON	3
6	1408210012	AFZAL AHMAD	4
7	1408210014	AKHIL SRIVASTAVA	5
8	1408210015	AMAN GAUR	5.5
9	1408210018	AMIT KUMAR	3.5
10	1408210023	ANCHIT GUPTA	4.5
11	1408210025	ANKIT KUMAR	4.5
12	1408210028	ANUKRITI AGARWAL	5
13	1408210030	APOORV MEHROTRA	1
14	1408210034	ARPAN SINGH	3
15	1408210036	ASHUTOSH	3.5
16	1408210037	ASHWANI KUMAR	2.5
17	1408210038	AVIRAL VISHNOI	1
18	1408210043	BHAWNA SHARMA	4.5
19	1408210045	DEEPA CHAUDHARY	5
20	1408210046	DEEPA GUSAIN	1.5
21	1408210047	DEEPIKA MATHUR	3
22	1408210049	DHARMENDRA SINGH	5.5
23	1408210056	GOURA JAIN	5.5
24	1408210061	IKRA	1
25	1408210062	ISHIKA PANT	2
26	1408210064	JEETESH RATHORE	5

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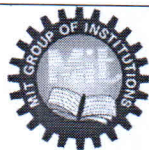
Action Taken for Weak Students

1. Providing Assignment Sheet
2. Give few questions to solve in the class.
3. Solve Previous Year Question Paper.

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1. Define AI. Discuss the history of AI in brief. [CO1]

2. What is an AI technique? Give some examples of problems to explain AI techniques. Why do we need to model human performance in AI? [CO1]

3. Answer the following in brief:

   A. Explain the Water Jug problem. [CO2]

   B. Discuss Turing test. [CO1]

   C. Differentiate between procedural and declarative knowledge. [CO3]

   E. What are difficulties in knowledge acquisition? [CO3]

   F. What is Inferencing?

   G. Differentiate between a Frame and a Script. [CO3]

4. What do you mean by Natural Language Processing? What are the features of natural languages that create challenges for processing of natural language by computers? [CO1]

5. Explain the following types of Hill Climbing search techniques. [CO2]

   i) Simple Hill Climbing. ii) Steepest-Ascent Hill Climbing. (E) iii) Simulated Annealing

6. What is A* search? Explain various stages of A* search with an example. [CO2]

7. Explain Alpha-beta pruning with algorithm and an example. [CO2]

8. How does iterative deepening help for search in binary tree? [CO2]

9. What are Production Systems? Discuss in detail the characteristics of production systems

[CO2]

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ATTENDENCE BEFORE CT -2
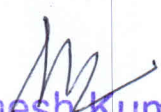
S.No	ROLL NO	STUDENT NAME	HELD	ATTEND	PERCENTAGE
1	1408210005	ABHIJEET SEJWAL	18	38	47.37
2	1408210010	ADITI SRIVASTAVA	21	38	55.26
3	1408210012	AFZAL AHMAD	22	38	57.89
4	1408210017	AMBER SAXENA	22	38	57.89
5	1408210018	AMIT KUMAR	12	38	31.58
6	1408210022	ANANYA BHATNAGAR	18	38	47.37
7	1408210023	ANCHIT GUPTA	18	38	47.37
8	1408210025	ANKIT KUMAR	20	38	52.63
9	1408210031	APOORV SHARMA	20	38	52.63
10	1408210033	ARJUN SINGH	20	38	52.63
11	1408210035	ARPITA ARORA	21	38	55.26
12	1408210036	ASHUTOSH	22	38	57.89
13	1408210038	AVIRAL VISHNOI	19	38	50.00
14	1408210040	AYUSH KR GUPTA	21	38	55.26
15	1408210042	AYUSHI RASTOGI	21	38	55.26
16	1408210044	CHETAN KUMAR	13	38	34.21
17	1408210054	EKANSHU BALYAN	19	38	50.00
18	1408210059	HIMANSHI GUPTA	21	38	55.26
19	1408210062	ISHIKA PANT	21	38	55.26
20	1408210063	JATIN GANDHI	8	38	21.05
21	1408210066	KIRTI RAIZADA	22	38	57.89

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MORADABAD INSTITUTE OF TECHNOLOGY
Class Test -2(2017-18)
Subject: Artificial Intelligence (NCS-702) Year/Sem: 4th /7th Sec :B,C,D   MM: 15

Note: Attempt all questions. Each question carry equal marks(3 marks each)

Q1.Discuss Alpha –Beta Pruning with example?CO-2

OR

Q2.Convert the following facts into predicate logic:CO-3

1) Poodles are dogs.

2) Cocoa is a poodle.

3) Every dog has his day.

4) Cats and dogs are enemies.

5) Calicos are cats.

6) Fluffy is a calico.

Q3.Illustrate Basis of Resolution . Also Discuss types of resolution.CO-3

Q4.Describe the properties of Knowledge Representation system with example. CO-3

Q5.Trace the constraint satisfaction procedure solving the following cryptarthmetic problem CO-3
CROSS + ROAD = DANGER

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Ans-1 Alpha–beta pruning is a search algorithm that seeks to decrease the number of nodes that are evaluated by the minimax algorithm in its search tree. When applied to a standard minimax tree, it returns the same move as minimax would, but prunes away branches that cannot possibly influence the final decision.

Key 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.

Ans-2 Production system or production rule system is a computer program typically used to provide some form of artificial intelligence, which consists primarily of a set of rules about behavior but it also includes the mechanism necessary to follow those rules as the system responds to states of the world.

Classes of Production System in Artificial Intelligence
There are four major classes of Production System in Artificial Intelligence:

- **Monotonic Production System**: It's a production system in which the application of a rule never prevents the later application of another rule, that could have also been applied at the time the first rule was selected.
- **Partially Commutative Production System**: It's a type of production system in which the application of a sequence of rules transforms state X into state Y, then any permutation of those rules that is allowable also transforms state x into state Y. Theorem proving falls under the monotonic partially communicative system.
- **Non-Monotonic Production Systems**: These are useful for solving ignorable problems. These systems are important from an implementation standpoint because they can be implemented without the ability to backtrack to previous states when it is discovered that an incorrect path was followed. This production system increases efficiency since it is not necessary to keep track of the changes made in the search process.
- **Commutative Systems**: These are usually useful for problems in which changes occur but can be reversed and in which the order of operation is not critical. Production systems that are not usually not partially commutative are useful for many problems in which irreversible changes occur, such as chemical analysis. When dealing with such systems, the order in which operations are performed is very important and hence correct decisions must be made at the first attempt itself.

Ans-3 Resolution method is **an inference rule** which is used in both Propositional as well as First-order Predicate Logic in different ways. This method is basically used for proving the satisfiability of a sentence. In resolution method, we use Proof by Refutation technique to prove the given statement.

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Resolution is **one kind of proof technique** that works this way - (i) select two clauses that contain conflicting terms (ii) combine those two clauses and (iii) cancel out the conflicting terms.

Steps for Resolution:

- Conversion of facts into first-order logic.
- Convert FOL statements into CNF.
- Negate the statement which needs to prove (proof by contradiction)
- Draw resolution graph (unification).

Resolution Method in Propositional Logic

-

1 Binary Resolution

We saw unit resolution (a propositional inference rule) in the previous lecture:

$A \lor B, \quad \neg B$

A

We can take this a little further to **propositional binary resolution**:

$A \lor B, \quad \neg B \lor C$

$A \lor C$

Binary resolution gets its name from the fact that each sentence is a disjunction of exactly two literals. We say the two opposing literals B and ¬B are **resolved** — they are removed when the disjunctions are merged.

2. The process followed to convert the propositional logic into resolution method contains the below steps:

Convert the given axiom into clausal form, i.e., disjunction form.

Apply and proof the given goal using negation rule.

Use those literals which are needed to prove.

Solve the clauses together and achieve the goal.
But, before solving problems using Resolution method, let's understand two normal forms

Conjunctive Normal Form
There are following steps used to convert into CNF:

- Eliminate the implications as:

?x: A(x) ? B(x) with {¬ x: ¬A(?x) V B(x)}

Move negation (¬) inwards as:

       ¬?x: A becomes ?x: ¬A and,

       ¬?x: A becomes ?x: ¬A

It means that the universal quantifier becomes existential quantifier and vice-versa.

Standardize variables: If two sentences use same variable, it is required to change the name of one variable. This step is taken so as to remove the confusion when the quantifiers will be dropped.
For example: { ?x: A(x) V ?x: B(x)}

Skolemize: It is the process of removing existential quantifier through elimination.

Drop universal quantifiers: If we are on this step, it means all remaining variables must be universally quantified. Drop the quantifier.

Distribute V over ?: Here, the nested conjunction and disjunction are flattened.
Disjunctive Normal Form (DNF)

Example OF Propositional Resolution
Consider the following Knowledge Base:

1.   The humidity is high or the sky is cloudy.

2.   If the sky is cloudy, then it will rain.

3.   If the humidity is high, then it is hot.

4.   It is not hot.
Goal: It will rain.
Use propositional logic and apply resolution method to prove that the goal is derivable from the given knowledge base.
Solution: Let's construct propositions of the given sentences one by one:

1.   Let, P: Humidity is high.

          Q: Sky is cloudy.
It will be represented as **P V Q.**
2) Q: Sky is cloudy.   **...from(1)**
Let, R: It will rain.
It will be represented as b**Q ? R.**
3) P: Humidity is high.   **...from(1)**
Let, S: It is hot.
It will be represented as **P ? S.**
4) ¬S: It is not hot.
Applying resolution method:
In (2), Q ? R will be converted as (¬Q V R)
In (3), P ? S will be converted as (¬P V S)
Negation of Goal (¬R): It will not rain.
Finally, apply the rule as shown below:

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P V Q   ¬Q V R
        P V R   ¬P V S
              R V S   ¬S
                    R   ¬R
                        Ø(Null)
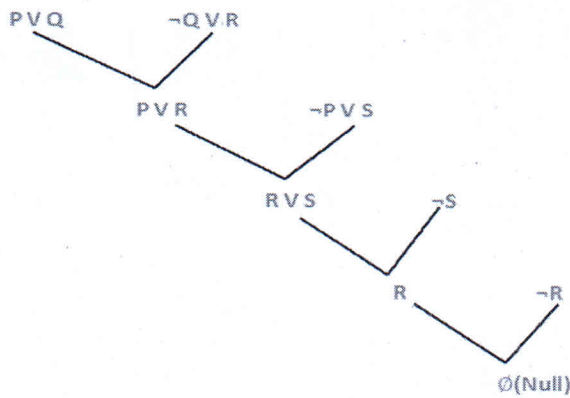
After applying Proof by Refutation (Contradiction) on the goal, the problem is solved, and it has terminated with a **Null clause (Ø).** Hence, the goal is achieved. Thus, It is not raining.

Ans-4 Knowledge Representation in AI describes the representation of knowledge. Basically, it is a study of how the **beliefs, intentions**, and **judgments** of an **intelligent agent** can be expressed suitably for automated reasoning. One of the primary purposes of Knowledge Representation includes modeling intelligent behavior for an agent.

Representation Requirements

A good knowledge representation system must have properties such as:

- **Representational Accuracy:** It should represent all kinds of required knowledge.
- **Inferential Adequacy**: It should be able to manipulate the representational structures to produce new knowledge corresponding to the existing structure.
- **Inferential Efficiency**: The ability to direct the inferential knowledge mechanism into the most productive directions by storing appropriate guides.
- **Acquisitional efficiency**: The ability to acquire new knowledge easily using automatic methods.

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In Pursuit of Excellence

Attendance
Subject: Artificial Intelligence
Subject Code:NCS-702

S.No.	Roll No.	Name of Students	CT-2
1.	1408210001	AAKASH TRIPATHI	A
2.	1408210002	AANCHAL VERMA	P
3.	1408210003	AASHIKA KAUSHIK	A
4.	1408210004	AAYUSHI AGARWAL	A
5.	1408210005	ABHIJEET SEJWAL	P
6.	1408210006	ABHINANDAN SRIVASTAVA	P
7.	1408210007	ABHISHEK	P
8.	1408210009	ABHISHEK KUMAR	P
9.	1408210010	ADITI SRIVASTAVA	A
10.	1408210011	ADITI TANDON	P
11.	1408210012	AFZAL AHMAD	P
12.	1408210014	AKHIL SRIVASTAVA	P
13.	1408210015	AMAN GAUR	P
14.	1408210016	AMAN RAJ	A
15.	1408210017	AMBER SAXENA	P
16.	1408210018	AMIT KUMAR	P
17.	1408210019	AMIT MAURYA	P
18.	1408210020	ANAMIKA SHARMA	P
19.	1408210021	ANAND YADAV	A
20.	1408210022	ANANYA BHATNAGAR	P

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21.	1408210023	ANCHIT GUPTA	P
22.	1408210024	ANJALI PARMAR	A
23.	1408210025	ANKIT KUMAR	P
24.	1408210026	ANKUR VARSHNEY	A
25.	1408210027	ANSHIKA PANDEY	A
26.	1408210028	ANUKRITI AGARWAL	A
27.	1408210029	ANUSHREE GUPTA	P
28.	1408210030	APOORV MEHROTRA	P
29.	1408210031	APOORV SHARMA	P
30.	1408210033	ARJUN SINGH	A
31.	1408210034	ARPAN SINGH	P
32.	1408210035	ARPITA ARORA	A
33.	1408210036	ASHUTOSH	P
34.	1408210037	ASHWANI KUMAR	A
35.	1408210038	AVIRAL VISHNOI	P
36.	1408210039	AVNEESH KAUSHIK	P
37.	1408210040	AYUSH KR GUPTA	P
38.	1408210041	AYUSH VERMA	P
39.	1408210042	AYUSHI RASTOGI	P
40.	1408210043	BHAWNA SHARMA	P
41.	1408210044	CHETAN KUMAR	P
42.	1408210045	DEEPA CHAUDHARY	P
43.	1408210046	DEEPA GUSAIN	P
44.	1408210047	DEEPIKA MATHUR	P
45.	1408210048	DEVANGNA RASTOGI	A
46.	1408210049	DHARMENDRA SINGH	P
47.	1408210050	DIKSHA PUSHPAK	P
48.	1408210054	EKANSHU BALYAN	A

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49.	1408210055	GARIMA AGARWAL	A
50.	1408210056	GOURA JAIN	p
51.	1408210058	HARSHIT GOEL	P
52.	1408210059	HIMANSHI GUPTA	A
53.	1408210060	HIMANSHU BHATNAGAR	A
54.	1408210061	IKRA	P
55.	1408210062	ISHIKA PANT	A
56.	1408210063	JATIN GANDHI	A
57.	1408210064	JEETESH RATHORE	P
58.	1408210065	KANIKA JAIN	A
59.	1408210066	KIRTI RAIZADA	A

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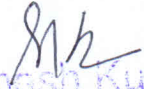
S.No.	University	Name of Students	Q1	Q2	Q3	Q4	Q5	Total
1	1408210001	AAKASH TRIPATHI	1	0.5	0.5	0.5	0.5	1
2	1408210002	AANCHAL VERMA	1	2	3	3	1	1
3	1408210003	AASHIKA KAUSHIK	1	0.5	2	0.5	1	1
4	1408210004	AAYUSHI AGARWAL	1	2	3	3	1	1
5	1408210005	ABHIJEET SEJWAL	1	2	1	1.5	1	1
6	1408210006	ABHINANDAN SRIVASTAVA	1	0	0.5	0.5	1	1
7	1408210007	ABHISHEK	1	0		0	0	1
8	1408210009	ABHISHEK KUMAR	1	2	3	0.5	1	1
9	1408210010	ADITI SRIVASTAVA	1	2	3	2.5	1	1
10	1408210011	ADITI TANDON	1	1			1	1
11	1408210012	AFZAL AHMAD	1	1.5	1	0.5		1
12	1408210014	AKHIL SRIVASTAVA	1	2		1	1	1
13	1408210015	AMAN GAUR	1	2	1.5	0	1	1
14	1408210016	AMAN RAJ	1	2	2	3	1	1
15	1408210017	AMBER SAXENA	1	2	1	1.5	1	1
16	1408210018	AMIT KUMAR	1	0	0.5	1	1	1
17	1408210019	AMIT MAURYA	1	2	3	2	1	1
18	1408210020	ANAMIKA SHARMA	1	2	0	2.5	1	1
19	1408210021	ANAND YADAV	1	2	3	3	1	1
20	1408210022	ANANYA BHATNAGAR	1	1.5	3	3	1	1
21	1408210023	ANCHIT GUPTA	1	2	1.5			1
22	1408210024	ANJALI PARMAR	0.5	2	2	0.5	1	0.5
23	1408210025	ANKIT KUMAR	0.5	2	1		1	0.5
24	1408210026	ANKUR VARSHNEY	1	2	3	2.5	1	1
25	1408210027	ANSHIKA PANDEY	1	1.5	2.5	2.5	1	1
26	1408210028	ANUKRITI AGARWAL	1	2	0	1	1	1
27	1408210029	ANUSHREE GUPTA	1	1.5	3	2.5	1	1
28	1408210030	APOORV MEHROTRA	0.5	0	0.5			0.5
29	1408210031	APOORV SHARMA	1	2	2.5	2.5	1	1
30	1408210033	ARJUN SINGH	1	2	3	3	1	1
31	1408210034	ARPAN SINGH	1	1	1			1
32	1408210035	ARPITA ARORA	1	2	3	3	1	1
33	1408210036	ASHUTOSH	1			2	0.5	1
34	1408210037	ASHWANI KUMAR	1		0.5		1	1
35	1408210038	AVIRAL VISHNOI	1	0				1

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36	1408210039	AVNEESH KAUSHIK	1	2	3	3	1	1
37	1408210040	AYUSH KR GUPTA	1	2	3	2	1	1
38	1408210041	AYUSH VERMA	1	1.5	2.5	3	1	1
39	1408210042	AYUSHI RASTOGI	1	2	3	3	1	1
40	1408210043	BHAWNA SHARMA	1	2	0.5	0	1	1
41	1408210044	CHETAN KUMAR	1	2	2	1.5	1	1
42	1408210045	DEEPA CHAUDHARY	1	2		1	1	1
43	1408210046	DEEPA GUSAIN	0	1.5	0		0	0
44	1408210047	DEEPIKA MATHUR	1	1			1	1
45	1408210048	DEVANGNA RASTOGI	1	2	3	2	1	1
46	1408210049	DHARMENDRA SINGH	0.5	2	1	1	1	0.5
47	1408210050	DIKSHA PUSHPAK	1	2	2.5	3	1	1
48	1408210054	EKANSHU BALYAN		1.5	3	3	1	
49	1408210055	GARIMA AGARWAL	0.5	1.5	2.5	2.5	1	0.5
50	1408210056	GOURA JAIN		1.5	1	2	1	
51	1408210058	HARSHIT GOEL	1	2	3	3	1	1
52	1408210059	HIMANSHI GUPTA	1	2	3	3	1	1
53	1408210060	HIMANSHU BHATNAGAR	0.5	1.5	3	2	1	0.5
54	1408210061	IKRA			0		1	
55	1408210062	ISHIKA PANT	0	0	1	0	1	0
56	1408210063	JATIN GANDHI	1	2	3	3	1	1
57	1408210064	JEETESH RATHORE		2		2	1	
58	1408210065	KANIKA JAIN	1	2	3	3	1	1
59	1408210066	KIRTI RAIZADA	0	2	3	3	1	0

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| | | Weak Student | SESSION-2017-2018 |
| | | | SEM-VII |

In Pursuit of Excellence

WEAK STUDENT LIST

S.No	Roll No	Student Name	total Marks
1	1408210001	AAKASH TRIPATHI	3
3	1408210003	AASHIKA KAUSHIK	5
6	1408210006	ABHINANDAN SRIVASTAVA	3
7	1408210007	ABHISHEK	1
10	1408210011	ADITI TANDON	3
11	1408210012	AFZAL AHMAD	4
12	1408210014	AKHIL SRIVASTAVA	5
13	1408210015	AMAN GAUR	5.5
16	1408210018	AMIT KUMAR	3.5
21	1408210023	ANCHIT GUPTA	4.5
23	1408210025	ANKIT KUMAR	4.5
26	1408210028	ANUKRITI AGARWAL	5
28	1408210030	APOORV MEHROTRA	1
31	1408210034	ARPAN SINGH	3
33	1408210036	ASHUTOSH	3.5
34	1408210037	ASHWANI KUMAR	2.5
35	1408210038	AVIRAL VISHNOI	1
40	1408210043	BHAWNA SHARMA	4.5
42	1408210045	DEEPA CHAUDHARY	5
43	1408210046	DEEPA GUSAIN	1.5
44	1408210047	DEEPIKA MATHUR	3
46	1408210049	DHARMENDRA SINGH	5.5
50	1408210056	GOURA JAIN	5.5
54	1408210061	IKRA	1
55	1408210062	ISHIKA PANT	2
57	1408210064	JEETESH RATHORE	5

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Action Taken for Weak Students

1. Providing Assignment Sheet
2. Give few questions to solve in the class.
3. Providing Question Bank.

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Artificial Intelligence (RCS 702)

10. Discuss Game playing as a challenging area of AI. [CO2]

11. Define minimax value with regards to optimal decision in games. [CO2]

12. Differentiate between forward and backward chaining with suitable examples. [CO3]

13. Illustrate the difference between Predicate Logic and First Order Predicate Logic with example.

[CO3]

14. What are the limitations of propositional logic to represent the knowledge base? Briefly discuss the syntax of FOPL. [CO3]

15. What is a Clause? Discuss the procedure to convert a sentence into clausal form with an example.

[CO3]

16. Consider the following sentences : [CO3]

   . John likes all kinds of food

   . Apples are food

   . Chicken is food

   . Anything anyone eats and isn't killed by is food

   . Bill eats peanuts and is still alive

   . Sue eats everything Bill eats.

iii) Translate these sentences into formulas in predicate logic

iv) Convert the formulas of part a into clause form.

17. Briefly Explain [CO3]

   i. Define Unification.

   ii. What is Modus Ponens rule? Give an example to show how it works.

18. What do you mean by uncertainty? Why uncertainty arises? [CO3]

19. Describe the use of Utility theory and functions. [CO3]

20. Write the general form of Bayes' theorem. [CO4]

21. What is an Expert system? Discuss the components and architecture of an expert system.

   [CO4

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1. Explain the Non-monotonic reasoning.[CO-1]

2. Explain the State Space with the use of 8 Puzzle Problem. [CO-2]

3. Explain the Best-First-Search Procedure with example. [CO-2]

4. Explain the Bayesian Networks. [CO-4]

5. Explain Probability and Bay's Theorem. [CO-4]

6. Describe briefly the applications of Neural Networks. [CO-4]

7. Explain A* algorithm. [CO-3]

8. Solve 8 Puzzle problems by any AI Technique. [CO-2]

9. Explain Steepest ascent Hill climbing algorithm. [CO-2]

10. Explain Semantic and Syntactic analysis in NLP. [CO-1]

11. Explain the algorithm for Back-propagation in Neural Networks. [CO-4]

12. Explain semantic net with example[CO-4]

13. Explain Instance And Is a Relationship with example. [CO-3]

14. Describe the use of Utility theory and functions. [CO-3]

15. What is an Expert system? Discuss the components and architecture of an expert system. [CO-3]

16. What is pattern recognition?Explain the difference between statistical and structural approaches? [CO-5]

17. What is parametric estimation method..What is difference between maximum likely hood and bayes method. [CO-5]

18. Explain feature extraction. [CO-5]

19. Write down properties of expectation-maximization algorithm.What is clustering. [CO-5]

20. Give criterion function of clustering. Give various important clustering algorithms. [CO-5]

21. Write short note on divise and agglomerative clustering.Explain Mean and Covariance. [CO-5]

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BRIGHT STUDENT LIST

S.No	Roll No	Student Name	total Marks
1	1408210002	AANCHAL VERMA	10
2	1408210004	AAYUSHI AGARWAL	10
3	1408210010	ADITI SRIVASTAVA	9.5
4	1408210016	AMAN RAJ	9
5	1408210019	AMIT MAURYA	9
6	1408210021	ANAND YADAV	10
7	1408210022	ANANYA BHATNAGAR	9.5
8	1408210026	ANKUR VARSHNEY	9.5
9	1408210027	ANSHIKA PANDEY	8.5
10	1408210029	ANUSHREE GUPTA	9
11	1408210031	APOORV SHARMA	9
12	1408210033	ARJUN SINGH	10
13	1408210035	ARPITA ARORA	10
14	1408210039	AVNEESH KAUSHIK	10
15	1408210040	AYUSH KR GUPTA	9
16	1408210041	AYUSH VERMA	9
17	1408210042	AYUSHI RASTOGI	10
18	1408210048	DEVANGNA RASTOGI	9
19	1408210050	DIKSHA PUSHPAK	9.5
20	1408210054	EKANSHU BALYAN	8.5
21	1408210058	HARSHIT GOEL	10
22	1408210059	HIMANSHI GUPTA	10
23	1408210063	JATIN GANDHI	10
24	1408210065	KANIKA JAIN	10
25	1408210066	KIRTI RAIZADA	9

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Action Taken for Bright Students

1. Discussing Question based on previous year Question paper.
2. Providing Assignment Sheet
3. Ask some challenging questions during lecture for brainstorming

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1 Define the term syntax and semantics in logic? [CO3]

2. Compare propositional logic and predicate logic. [CO3]

3 What is Resolution principle? Discuss the algorithm for propositional resolution with an example.

[CO3]

4. Consider the following sentences : [CO3]

. John likes all kinds of food

. Apples are food

. Chicken is food

. Anything anyone eats and isn't killed by is food

. Bill eats peanuts and is still alive

. Sue eats everything Bill eats.

v) Translate these sentences into formulas in predicate logic

vi) Convert the formulas of part a into clause form.

5. Briefly Explain [CO3]

i. Define Unification.

ii. What is Modus Ponens rule? Give an example to show how it works.

6. What do you mean by uncertainty? Why uncertainty arises? [CO3]

7. Apply cryptarithmetic method to solve the following CSP problem [CO2]

```
      S E N D
  +   M O R E
  ============
    M O N E Y
```

8. Describe the use of Utility theory and functions. [CO3]

9. Write the general form of Bayes' theorem. [CO4]

10. What is an Expert system? Discuss the components and architecture of an expert system.

[CO4]

MORADABAD INSTITUTE OF TECHNOLOGY
Computer Science Engineering
Class Test-3(2017-18)

Subject:-Artificial Intelligence(NCS -702)   Year/Sem:-4th/7th   Sec:-B,C,D   MM:-15

Note:-Attempt all question

Q1.What is pattern recognition? Explain component of pattern recognition. **(3 marks) CO-5**

Q2.What is probabilistic reasoning? Also describe the role HMM in probabilistic reasoning. **(3 marks) CO-4**

Q3.Differentiate between any two : **(3 marks) CO-4**
(a) Supervised and Unsupervised learning.   (b)Forward and backward Reasoning.
(c) Passive and active reinforcement learning.

Q4. Explain learning with complete data -Naive Bayes Models and learning with hidden data-EM algorilhm? **(3 marks) CO-5**

Q5.Explain Bayesian Network by taking an example. How is the Bayesian network powerful representation for uncertainity knowledge? **(3 marks) CO-4**

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Ans-1 pattern recognition, in computer science, **the imposition of identity on input data,** such as speech, images, or a stream of text, by the recognition and delineation of patterns it contains and their relationships

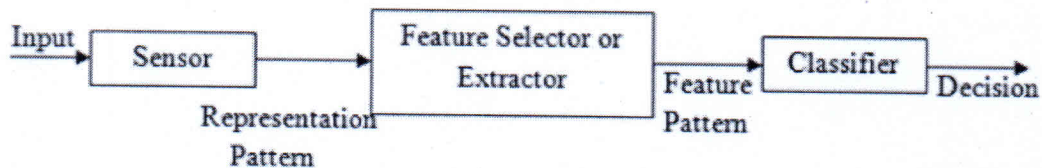The basic model of pattern classifiers is shown in figure.

Figure A common Pattern Classifier

Figure A common Pattern Classifier

A complete pattern recognition system consists of:

(a) A sensor: It gathers the information to be classified.

(b) A feature selector or Extractor: Feature selection is the process of selecting a subset of a given set of variables. The feature extractor mechanism takes a possible non linear combination of the original variables to form new variables.

(c) A classifier: It classifies or describes the observations relying on the extracted features.

Ans-2 Probabilistic reasoning is **a way of knowledge representation where we apply the concept of probability to indicate the uncertainty in knowledge.** In probabilistic reasoning, we combine probability theory with logic to handle the uncertainty.

hidden Markov model (HMM) is an augmentation of a Markov chain to include observations. A hidden Markov model includes the state transition of the Markov chain, and adds to it observations at each time that depend on the state at the time. These observations can be **partial** in that different states map to the same observation and **noisy** in that the same state stochastically maps to different observations at different times.

The assumptions behind an HMM are:

The state at time $t+1$ only directly depends on the state at time t for $t \geq 0$, as in the Markov chain

The observation at time t only directly depends on the state at time t.

The observations are modeled using the variable O_t for each time t whose domain is the set of possible observations. The belief network representation of an HMM is depicted. Although the belief network is shown for five stages, it extends indefinitely.
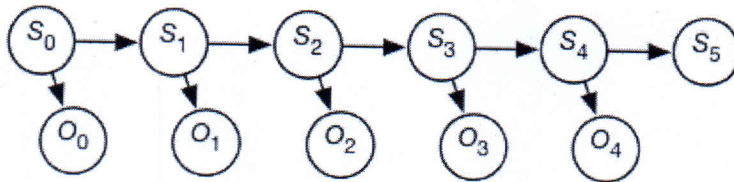
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Fig: A hidden Markov model as a belief network

A stationary HMM includes the following probability distributions:

$P(S0)P$ $(S0)$ specifies initial conditions

$P(St+1|St)P$ $(St+1|St)$ specifies the dynamics

$P(Ot|St)P$ $(Ot|St)$ specifies the sensor model.

Ans-3 (a)Supervised learning is a machine learning approach that's defined by its use of labeled datasets. These datasets are designed to train or "supervise" algorithms into classifying data or predicting outcomes accurately. Using labeled inputs and outputs, the model can measure its accuracy and learn over time.

Unsupervised learning

uses machine learning algorithms to analyze and cluster unlabeled data sets. These algorithms discover hidden patterns in data without the need for human intervention (hence, they are "unsupervised").

Ans3(b)Key Differences Between Forward and Backward Reasoning in AI

1. The forward reasoning is data-driven approach while backward reasoning is a goal driven.

2. The process starts with new data and facts in the forward reasoning. Conversely, backward reasoning begins with the results.

3. Forward reasoning aims to determine the result followed by some sequences. On the other hand, backward reasoning emphasis on the acts that support the conclusion.

4. The forward reasoning is an opportunistic approach because it could produce different results. As against, in backward reasoning, a specific goal can only have certain predetermined initial data which makes it restricted.

5. The flow of the forward reasoning is from the antecedent to consequent while backward reasoning works in reverse order in which it starts from conclusion to incipient.

Ans3(c)-Both active and passive reinforcement learning are **types of RL**. In case of passive RL, the agent's policy is fixed which means that it is told what to do. In contrast to this, in active RL, an agent needs to decide what to do as there's no fixed policy that it can act on.

Active reinforcement learning is based on the concept, if a learning algorithm can choose the data it wants to learn from, it can perform better than traditional methods with substantially less data for training. So it's kind of semi-supervised machine learning

Passive reinforcement learning is when we want an agent to learn about the utilities of various states under a fixed policy. Since the choices for each state are predetermined, passive reinforcement learning is not particularly useful for letting an agent learn how it should behave in an environment, but it's useful for us to learn as one step on the way to active reinforcement learning.

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Attendance
Subject: Artificial Intelligence
Subject Code:NCS-702

S.No.	Roll No.	Name of Students	CT-3
1.	1408210001	AAKASH TRIPATHI	P
2.	1408210002	AANCHAL VERMA	P
3.	1408210003	AASHIKA KAUSHIK	P
4.	1408210004	AAYUSHI AGARWAL	P
5.	1408210005	ABHIJEET SEJWAL	A
6.	1408210006	ABHINANDAN SRIVASTAVA	A
7.	1408210007	ABHISHEK	P
8.	1408210009	ABHISHEK KUMAR	A
9.	1408210010	ADITI SRIVASTAVA	P
10.	1408210011	ADITI TANDON	A
11.	1408210012	AFZAL AHMAD	A
12.	1408210014	AKHIL SRIVASTAVA	A
13.	1408210015	AMAN GAUR	P
14.	1408210016	AMAN RAJ	P
15.	1408210017	AMBER SAXENA	P
16.	1408210018	AMIT KUMAR	A
17.	1408210019	AMIT MAURYA	P
18.	1408210020	ANAMIKA SHARMA	P
19.	1408210021	ANAND YADAV	P
20.	1408210022	ANANYA BHATNAGAR	P

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21.	1408210023	ANCHIT GUPTA	P
22.	1408210024	ANJALI PARMAR	P
23.	1408210025	ANKIT KUMAR	P
24.	1408210026	ANKUR VARSHNEY	P
25.	1408210027	ANSHIKA PANDEY	P
26.	1408210028	ANUKRITI AGARWAL	P
27.	1408210029	ANUSHREE GUPTA	P
28.	1408210030	APOORV MEHROTRA	P
29.	1408210031	APOORV SHARMA	P
30.	1408210033	ARJUN SINGH	P
31.	1408210034	ARPAN SINGH	P
32.	1408210035	ARPITA ARORA	P
33.	1408210036	ASHUTOSH	P
34.	1408210037	ASHWANI KUMAR	P
35.	1408210038	AVIRAL VISHNOI	P
36.	1408210039	AVNEESH KAUSHIK	P
37.	1408210040	AYUSH KR GUPTA	P
38.	1408210041	AYUSH VERMA	P
39.	1408210042	AYUSHI RASTOGI	P
40.	1408210043	BHAWNA SHARMA	P
41.	1408210044	CHETAN KUMAR	P
42.	1408210045	DEEPA CHAUDHARY	P
43.	1408210046	DEEPA GUSAIN	P
44.	1408210047	DEEPIKA MATHUR	P
45.	1408210048	DEVANGNA RASTOGI	P
46.	1408210049	DHARMENDRA SINGH	A
47.	1408210050	DIKSHA PUSHPAK	P
48.	1408210054	EKANSHU BALYAN	P

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49.	1408210055	GARIMA AGARWAL	P
50.	1408210056	GOURA JAIN	A
51.	1408210058	HARSHIT GOEL	A
52.	1408210059	HIMANSHI GUPTA	A
53.	1408210060	HIMANSHU BHATNAGAR	P
54.	1408210061	IKRA	A
55.	1408210062	ISHIKA PANT	P
56.	1408210063	JATIN GANDHI	P
57.	1408210064	JEETESH RATHORE	A
58.	1408210065	KANIKA JAIN	P
59.	1408210066	KIRTI RAIZADA	P

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S.No.	University	Name of Students	Q1	Q2	Q3	Q4	Q5	Total
1	1408210001	AAKASH TRIPATHI	1	2	2	1	1	7
2	1408210002	AANCHAL VERMA	1	2	3	3	1	10
3	1408210003	AASHIKA KAUSHIK	1		3	3	1	8
4	1408210004	AAYUSHI AGARWAL	1	2	0	2	1	6
5	1408210005	ABHIJEET SEJWAL	1	2	3	2		8
6	1408210006	ABHINANDAN SRIVASTAVA	1	2	3	2	1	9
7	1408210007	ABHISHEK	1			2	1	4
8	1408210009	ABHISHEK KUMAR	1			3	1	5
9	1408210010	ADITI SRIVASTAVA	1	2	1.5	3	1	8.5
10	1408210011	ADITI TANDON	1	1	2	3		7
11	1408210012	AFZAL AHMAD	1	2	1	2		6
12	1408210014	AKHIL SRIVASTAVA	1		2	2	1	6
13	1408210015	AMAN GAUR	1	2	3	3	1	10
14	1408210016	AMAN RAJ	1	2	3	3	1	10
15	1408210017	AMBER SAXENA	1	2	3	3	1	10
16	1408210018	AMIT KUMAR	1	2	2	1	1	7
17	1408210019	AMIT MAURYA	1	2	3	3	1	10
18	1408210020	ANAMIKA SHARMA	1	2	1	3	1	8
19	1408210021	ANAND YADAV	1	2	3	3	1	10
20	1408210022	ANANYA BHATNAGAR	1	2	3	3	1	10
21	1408210023	ANCHIT GUPTA	1	2	2		1	6
22	1408210024	ANJALI PARMAR	1	1	1		1	4
23	1408210025	ANKIT KUMAR	1	1		1	1	4
24	1408210026	ANKUR VARSHNEY	1	1	2		1	5
25	1408210027	ANSHIKA PANDEY	1			3	0	4
26	1408210028	ANUKRITI AGARWAL	1	1.5	1	3	1	7.5
27	1408210029	ANUSHREE GUPTA	1	2	3	3	1	10
28	1408210030	APOORV MEHROTRA		2	1	2		5
29	1408210031	APOORV SHARMA	0		1	2		3
30	1408210033	ARJUN SINGH						0
31	1408210034	ARPAN SINGH	1	0		2	1	4
32	1408210035	ARPITA ARORA						0
33	1408210036	ASHUTOSH	1		3	3	1	8
34	1408210037	ASHWANI KUMAR	1	0	3	3	1	8

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35	1408210038	AVIRAL VISHNOI	1			3	2		6
36	1408210039	AVNEESH KAUSHIK	1	2	2.5	3	1	9.5
37	1408210040	AYUSH KR GUPTA						0
38	1408210041	AYUSH VERMA	1			3		4
39	1408210042	AYUSHI RASTOGI	1	2	3		1	7
40	1408210043	BHAWNA SHARMA	1	1	2	1	1	6
41	1408210044	CHETAN KUMAR	1		2	3	1	7
42	1408210045	DEEPA CHAUDHARY	1	1	3	2		7
43	1408210046	DEEPA GUSAIN						0
44	1408210047	DEEPIKA MATHUR	1	2	1			4
45	1408210048	DEVANGNA RASTOGI						0
46	1408210049	DHARMENDRA SINGH						0
47	1408210050	DIKSHA PUSHPAK						0
48	1408210054	EKANSHU BALYAN	1		3	3		7
49	1408210055	GARIMA AGARWAL	1		1			2
50	1408210056	GOURA JAIN						0
51	1408210058	HARSHIT GOEL						0
52	1408210059	HIMANSHI GUPTA	1	2		3	1	7
53	1408210060	HIMANSHU BHATNAGAR	1	1	3	3	1	9
54	1408210061	IKRA	1			2		3
55	1408210062	ISHIKA PANT	1			2	1	4
56	1408210063	JATIN GANDHI	1	2	3	3	1	10
57	1408210064	JEETESH RATHORE	1	0		1	1	3
58	1408210065	KANIKA JAIN	1	2	2	1	1	7
59	1408210066	KIRTI RAIZADA	1	2	3	3	1	10

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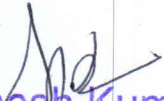
Artificial Intelligence
UNIT-1 (CO-1)

1. Define Artificial Intelligence. Discuss the goal of Artificial Intelligence.
2. What do you understand by Artificial Intelligence? Why AI is important. [Imp]
3. Explain Intelligence and Artificial Intelligence system. How do they distinguish?
4. What Computer can do better than Human Being?
5. Differentiate between AI and Conventional Program?
6. Explain how Conventional Computing differs from the Intelligence Computing.
7. Discuss in brief the evolution of AI. Discuss the foundation and history of AI.
8. Discuss in details the application areas of Artificial Intelligence.
9. Explain three application area of Artificial Intelligence. [Imp]
10. What is Turing Test?
11. Differentiate between Strong AI and Weak AI.
12. Explain the Components of Artificial Intelligence. [Imp]
13. What are the different branches of AI? [Imp]
14. What is Agent Program? Discuss the type of Agent Program. [Imp]
15. Give the structure of Intelligent Agent and draw schematic diagram of a Model Based Reflex Agent and Learning Agent. [M. Imp]
16. What do mean by Computer Vision? Discuss the goal of Computer Vision. Why Computer Vision is difficult?
17. Discuss the problem of "Water Jug Problem" with Heuristic search techniques. [M. Imp]
18. You have three jugs measuring 12 gallons, 8 gallons, and 3 gallons and water tap. You can fill the jugs up or empty then out from one another or onto the ground. Your objective is to measure out exactly one gallon. Give the complete state space and set of all application feasible rules. [M. Imp]
19. What do you mean by Natural Language Processing? What it is needed? [M. Imp]
20. Describe the difference between Language Understanding and Language Generation with suitable example. [Imp]
21. What are the basic components of Natural Language?
22. Discuss the basic elements of Natural Language Processing. [M. Imp]

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UNIT- II(CO-2)

1. What is Search Process? What is the need of Search Method in AI?
2. Explain Searching for Solutions.
3. Discuss the type of Search
4. Discuss in details the Depth First Search and Breadth First Search with algorithm. Also differentiate between Depth First Search and Breadth First Search. [M. Imp]
5. Give the comparison of Uniformed Search Strategies.
6. What is Heuristic Search? [M. Imp]
7. Distinguish between Heuristics and Algorithm. Support your answer with the help of example. [Imp]
8. Write down Heuristic function for 8-puzzle problem and justify.
9. Explain Hill Climbing Algorithm. [M. Imp]
10. When will Hill Climbing Search technique fail? Do Steepest Ascent Hill Climbing always find solutions? How some problem might be overcome in search? [M Imp]
11. Prove that Breadth First Search and Depth First Search are special cases of Best Find Search. [Imp]
12. Explain A* Algorithm. [M. Imp]
13. Explain AO* Algorithm. [M. Imp]

14. Describe how Branch and Bound techniques could be used to find the smallest path solution to a Travelling Salesman Problem.

15. Solve the Water Jug Problem with the capacity of the two Jugs of 3 and 4 litres with no marking in them. Given a water supply with a large storage using these two Jugs, how can you separate 2 litres of water? Also draw the tree, representing the transition of state. [Imp]
16. Explain Travelling Salesman Problem using Branch and Bound technique.
17. Specify a global database rules and termination condition for a production system to solve the following Water jug Problem. Given a 4 litre jug filled with water and an empty 3 litre jug how can one obtain precisely 2 litre water in 3 litre jug water may either be discarded or poured from one jug to another or fill with water pumps. [Imp]
18. Explain Uniform Cost Search Algorithm or Branch bound Algorithm
19. Write down the Heuristic Function for Tic – Tac – Toe.

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UNIT- III (CO-3)

1. Describe the meaning of Knowledge Representation and Knowledge Acquisition. [Imp]
2. What is the need of Knowledge Representation? Explain its two entities.
3. Describe the various Knowledge Representation Schemes used in Ai. [Imp]
4. List various schemes of Knowledge Representation. Discuss one Representation schemes in details.
5. What are the desirable properties of a good Knowledge Representation Scheme?[imp]
6. What is Logic? Discuss its Role and its Classification
7. Write short notes on:
   (a) Tautologies   (b) Contradictions and(c) Contingencies
8. Convert the formula (A - > ((B ^ C) - > D))) into DNF.
9. Convert the formula ((A - > B) - > C) - > C) into CNF.
10. Explain the Conversion Procedure to Normal Form
11. Explain First Order Logic or Predicate Logic with example
12. Explain Inference Rules in brief with example. Represent such expression in FOPL.
    (a) All employees earning $500 or more per year pay taxes.
    (b) Some employees are sick today
13. Differentiate between Forward and Backward Chaining system.
14. Define Resolution. What is the basic of Resolution?
15. Represent the following sentence into first order logic (FOL). [M. Imp]
    (a) Lipton is a tea
    (b) Lata is a child who drinks tea
    (c) Ruma dislikes children who drink tea
    (d) Ruma dislikes Lata
16. Rewrite the following sentence in FOPL: [M. Imp]
    (a) Coconut is a biscuit
    (b) Marry is a child who takes coconut
    (c) John loves children who takes biscuits
    (d) For a triangle ABC it is given that sum of the interior angle is 180 degree.
17. Explain Horn Clause. What is the procedure of clausal conversion with example? [Imp]
18. Draw a hierarchical network to represent the information. "Mouse is a rodent; rodent is a mammal; A mammal has color and also drinks water".
19. What is Frame? Differentiate it with Semantic Net by giving suitable example. [Imp]
20. Describe Frames with suitable example.
21. What is Hidden Markov Model (HMM).
22. Represent following sentences in symbol logic:
    (a) All students like good teachers.
    (b) All that glitters is not gold
    (c) Fruits and vegetables are delicious

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UNIT- IV (CO-4)

1. What is learning? Explain the important components of Learning [Imp]

2. Write down the performance measure for Learning [M. Imp]

3. Explain Learning Agent [Imp]

4. Difference between Supervised and Unsupervised Learning [M. Imp]

5. Explain Decision Tree Learning. How can we express Decision Trees? [Imp]

6. What is Overfitting? Discuss the techniques which are used to reduce the Overfitting.

7. Discuss the issues related to the application of Decision Trees.

8. Explain Statistical learning. [Imp]

9. Discuss the term Bayesian Learning. [M. Imp]

10. Explain Discrete Model. Or What do you understand by Maximum-likelihood parameter learning

11. Discuss the Continuous Models. [Imp]

12. Discuss the Naive Bayes Models

13. What is learning with Hidden Data? Or Describe the term Hidden variable

14. Discuss the EM algorithm

15. Discuss the Unsupervised Clustering [M. Imp]

16. What is Reinforcement Learning? [Imp]

17. What is Markov Decision Problem?

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UNIT- V(CO-5)

1. Write the short notes on Pattern Recognition

2. Explain the process of Recognition Problem [Imp]

3. Discuss the classification approach of pattern Recognition [M. Imp]

4. What are the components used to design a Pattern Recognition System?

5. Explain the design principles of Pattern Recognition System.

6. Explain the cycle of Pattern Recognition System

7. Write down the activities used to design a Pattern Recognition System

8. What is Statistical Pattern Recognition? [Imp]

9. Discuss the LDA parameter estimation method. Give the difference between PCA and LDA. [M. Imp]

10. Explain the LDA for two classes.

11. Write down the application of Linear Discriminate Analysis (LDA). [M. Imp]

12. Explain the Nearest Neighbour Rule in Pattern Recognition.

13. Explain the Nearest Neighbour cluster algorithm

14. Discuss Bayes Classifier

15. What do you understand by Support Vector Machine (SVM)

16. Explain K-means clustering

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Printed Pages : 4 | 1232 | **ECS801**

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 110703   Roll No. | | | | | | | | | |

B.TECH.

(SEM. VII) THEORY EXAMINATION, 2015-16

ARTIFICIAL INTELLIGENCE

[Time:3 hours]   [Total Marks:100]

SECTION-A

Note: All questions are *compulsory.*

1. Attempt all parts . All parts carry equal marks. Write answer of all part in short .   (2x10=20)

    (a) Define support vector machine.

    (b) Describe the role of computer vision.

    (c) What do you mean by intelligent agent?

    (d) Define informational equivalence and computational equivalence.

    (e) Discuss the various types of model of parallel algorithm with example.

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(f) Define Modus Ponen's rule in propositional logic?

(g) Define inductive learning. How the performance of inductive learning algorithms can be measured?

)   (1)   P.T.O.

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learning system.

(i) Describe how can we use artificial intelligence in Natural Language Processing?

(j) Describe the role of rational agent.

SECTION-B

Attempt **any five** questions from this section.   (10x5=50)

2. (a) Describe AO* search technique.

    (b) What is intelligent agent? Describe basic kinds of agents programs.

3. (a) Distinguish between Markov Modle and Hidden Markov Model (HMM).

    (b) Draw diagram of HMM and show what is the hidden part of it that we refer to?

4. Translate following sentences in formulas in predicate logic and casual form:

(a) Mutton is food.

(b) Anything one eats and it does not kill is a food.

(c) Rajiv eats everthing that Sue eats.

(d) Kin eats peanuts and is still alive.

(e) John will marry Mary if Mary loves John.

.00   (2)   ECS801

        SEND

       +MORE

        MONEY

    ----

6. Discuss the problem of water jug with heuristic search tecniques?

7. What are the desirable properties of good knowledge representation schemes?

8. Explain Bayesian network by taking an example. How is the Bayesian network powerful representation for uncertainity knowledge?

9. Explain about the Hill climbing algorithm with its drawback and how it can be overcome?

SECTION-C

Attempt **any two** questions from this section.   (15x2=30)

10. (a) Write steps involved in making Principle Components to do a classification of given data.

    (b) Determne 2 Principle components of the following set of observations of 2-dimensional data having 5 examples.

5500   •   (3)   P.T.O.

1	-1.3	-1.8
2	-0.6	-0.9
3	0	0
4	0.6	0.9
5	1.3	1.8

11. Explain Min-Max procedure. Describe alpha beta pruning and give the other modifications to the min max procedure to improve its performance.

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11. Explain Min-Max procedure. Describe alpha beta pruning and give the other modifications to the min max procedure to improve its performance.

12. Write a short notes on:

   (a) EM Algorithm

   (b) Support Vector Machine

   (c) Backtracking

—x—

Printed Pages : 3

ECS801

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 110801

Roll No.

B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15

ARTIFICIAL INTELLIGENCE

Time : 3 Hours]   [Total Marks : 100

Note: Attempt all questions.

1   Attempt **any four** parts of the following: $5 \times 4 = 20$

   (a) Explain the term artificial intelligence. How does it differ from general intelligence?

   (b) Describe the role of different disciplines in the emergence of artificial intelligence as a new science.

   (c) What is an agent program? Describe the structure of a typical agent program.

   (d) List some of the state-of-the-art applications of the artificial intelligence.

   (e) Describe the role of artificial intelligence in computer vision.

   (f) How does a language processing system work.

110801]   1   [Contd...

2   Attempt **any two** parts of the following: 10×2=20

   (a)   Describe the role of artificial intelligence in search. Illustrate your answer using 8-queens problem.

   (b)   Explain BFS and DFS search techniques in detail.

   (c)   Describe A* search technique. Prove that A* is complete and optimal.

3   Attempt **any two** parts of the following: 10×2=20

   (a)   Determine whether the following argument is valid.

      "If I work whole night on this problem, then I can solve it. If I solve the problem, then I will understand the topic. Therefore, I will work whole night on this problem, then I will understand the topic."

   (b)   Define Hidden Markov Model (HMM). Illustrate how HMMs are used for speech recognition.

   (c)   Describe Bayesian networks. How does the Bayesian networks are the powerful representation for uncertainty knowledge?

4   Attempt **any two** parts of the following: 10×2=20

   (a)   What do mean by machine learning? Illustrate any two supervised learning techniques.

   (b)   Explain decision trees learning technique using a suitable example.

   (c)   Elaborate Naïve Bayes model in detail.

110801]   2   [Contd...

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5   Write short notes on **any four** of the following: **5×4=20**

    (a)   Pattern Recognition System

    (b)   Principle Component analysis

    (c)   Discriminant Component Analysis

    (d)   Clustering

    (e)   Support vector machine

    (f)   Artificial neural networks

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S.No.	University	Name of Students	CT-1	CT-2	CT-3	CT	ATT	TUTE	Total
1	1408210001	AAKASH TRIPATHI	12.5	3	7	19	8	10	37
2	1408210002	AANCHAL VERMA	8	10	10	24	9	10	43
3	1408210003	AASHIKA KAUSHIK	14	5	8	28	7	10	45
4	1408210004	AAYUSHI AGARWAL	12.5	10	6	18	8	10	36
5	1408210005	ABHIJEET SEJWAL	11.5	6.5	8	19	7	10	36
6	1408210006	ABHINANDAN SRIVASTAVA	12.5	3	9	22	8	10	40
7	1408210007	ABHISHEK	3.5	1	4	21	9	10	40
8	1408210009	ABHISHEK KUMAR	11	7.5	5	23	9	10	42
9	1408210010	ADITI SRIVASTAVA	17	9.5	8.5	31	8	10	49
10	1408210011	ADITI TANDON	13.5	3	7	25	8	10	43
11	1408210012	AFZAL AHMAD	11	4	6	18	7	10	35
12	1408210014	AKHIL SRIVASTAVA	13	5	6	22	10	10	42
13	1408210015	AMAN GAUR	14	5.5	10	27	10	10	47
14	1408210016	AMAN RAJ	14.5	9	10	27	10	10	47
15	1408210017	AMBER SAXENA	15	6.5	10	26	7	10	43
16	1408210018	AMIT KUMAR	0	3.5	7	10	10	10	30
17	1408210019	AMIT MAURYA	11.5	9	10	13	9	10	32
18	1408210020	ANAMIKA SHARMA	12	6.5	8	19	8	10	37
19	1408210021	ANAND YADAV	12	10	10	20	8	10	38
20	1408210022	ANANYA BHATNAGAR	0	9.5	10	13	7	10	30
21	1408210023	ANCHIT GUPTA	5.5	4.5	6	24	7	10	41
22	1408210024	ANJALI PARMAR	15	6	4	26	8	10	44
23	1408210025	ANKIT KUMAR	0	4.5	4	15	8	10	33
24	1408210026	ANKUR VARSHNEY	17.5	9.5	5	29	10	10	49
25	1408210027	ANSHIKA PANDEY	12.5	8.5	4	14	8	10	32
26	1408210028	ANUKRITI AGARWAL	15	5	7.5	27	8	10	45
27	1408210029	ANUSHREE GUPTA	14	9	10	30	9	10	49
28	1408210030	APOORV MEHROTRA	13.5	1	5	29	8	10	47
29	1408210031	APOORV SHARMA	11.5	9	3	17	7	10	34
30	1408210033	ARJUN SINGH	10	10	0	13	7	10	30
31	1408210034	ARPAN SINGH	0	3	4	24	8	10	42
32	1408210035	ARPITA ARORA	12.5	10	0	23	7	10	40
33	1408210036	ASHUTOSH	0.5	3.5	8	20	7	10	37
34	1408210037	ASHWANI KUMAR	13	2.5	8	20	7	10	37
35	1408210038	AVIRAL VISHNOI	12.5	1	6	17	7	10	34

36	1408210039	AVNEESH KAUSHIK	9	10	9.5	29	8	10	47
37	1408210040	AYUSH KR GUPTA	1.5	9	0	19	7	10	36
38	1408210041	AYUSH VERMA	5	9	4	26	8	10	44
39	1408210042	AYUSHI RASTOGI	5.5	10	7	30	8	10	48
40	1408210043	BHAWNA SHARMA	13	4.5	6	23	10	10	43
41	1408210044	CHETAN KUMAR	9	7.5	7	15	7	10	32
42	1408210045	DEEPA CHAUDHARY	6	5	7	23	7	10	40
43	1408210046	DEEPA GUSAIN	9	1.5	0	29	10	10	49
44	1408210047	DEEPIKA MATHUR	7.5	3	4	28	10	10	48
45	1408210048	DEVANGNA RASTOGI	13	9	0	23	9	10	42
46	1408210049	DHARMENDRA SINGH	14.5	5.5	0	29	10	10	49
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49	1408210055	GARIMA AGARWAL	13	8	2	18	8	10	36
50	1408210056	GOURA JAIN	12.5	5.5	0	27	9	10	46
51	1408210058	HARSHIT GOEL	12.5	10	0	26	7	10	43
52	1408210059	HIMANSHI GUPTA	12	10	7	12	8	10	30
53	1408210060	HIMANSHU BHATNAGAR	13	8	9	24	8	10	42
54	1408210061	IKRA	13	1	3	26	7	10	43
55	1408210062	ISHIKA PANT	13	2	4	23	7	10	40
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In Pursuit of Excellence

Course Name	Artificial Intelligence
Course Code	NCS702
Batch	2014 2018
Semester	7
Session	2017 2018
L:T:P	3.0.0

For Each CO, Questions were answered by students on scale of 1 to 5 - most negative to most positive response.

Q1	Course Outcomes, COs, were discussed upfront and clear.
Q2	Instructional Activities helped in the attainments of COs.
Q3	Time devoted to each CO was quite adequate.
Q4	Assessments were relevant to stated COs.
Q5	Examples relevant to COs were worked out well and useful

Indirect CO Attainment through Course Exit Survey

| S.No.	Univ. Roll No.	Name	Q1 CO1	Q1 CO2	Q1 CO3	Q1 CO4	Q1 CO5	Q2 CO1	Q2 CO2	Q2 CO3	Q2 CO4	Q2 CO5	Q3 CO1	Q3 CO2	Q3 CO3	Q3 CO4	Q3 CO5	Q4 CO1	Q4 CO2	Q4 CO3	Q4 CO4	Q4 CO5	Q5 CO1	Q5 CO2	Q5 CO3	Q5 CO4	Q5 CO5
		Max Rating	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
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2	1408210002	AANCHAL VERMA	5	4	5	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3	1408210003	AASHIKA KAUSHIK	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4	1408210004	AAYUSHI AGARWAL	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5	1408210005	ABHIJEET SEJWAL	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	1408210006	ABHINANDAN SRIVASTAVA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
7	1408210007	ABHISHEK	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
8	1408210009	ABHISHEK KUMAR	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
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10	1408210011	ADITI TANDON	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
11	1408210012	AFZAL AHMAD	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
12	1408210014	AKHIL SRIVASTAVA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
13	1408210015	AMAN GAUR	5	5	5	5	5	5	3	5	5	5	5	3	5	5	5	5	2	2	5	5	5	5	2	2	5
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15	1408210017	AMBER SAXENA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
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17	1408210019	AMIT MAURYA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
18	1408210020	ANAMIKA SHARMA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
19	1408210021	ANAND YADAV	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
20	1408210022	ANANYA BHATNAGAR	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
21	1408210023	ANCHIT GUPTA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
22	1408210024	ANJALI PARMAR	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
23	1408210025	ANKIT KUMAR	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
24	1408210026	ANKUR VARSHNEY	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
25	1408210027	ANSHIKA PANDEY	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
26	1408210028	ANUKRITI AGARWAL	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
27	1408210029	ANUSHREE GUPTA	5	5	5	5	5	5	3	5	5	5	5	3	5	5	5	5	2	2	5	5	5	5	2	2	5
28	1408210030	APOORV MEHROTRA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
29	1408210031	APOORV SHARMA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
30	1408210033	ARJUN SINGH	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
31	1408210034	ARPAN SINGH	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
32	1408210035	ARPITA ARORA	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
33	1408210036	ASHUTOSH	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
34	1408210037	ASHWANI KUMAR	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
35	1408210038	AVIRAL VISHNOI	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
36	1408210039	AVNEESH KAUSHIK	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
37	1408210040	AYUSH KR GUPTA	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
38	1408210041	AYUSH VERMA	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
39	1408210042	AYUSHI RASTOGI	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
40	1408210043	BHAWNA SHARMA	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
41	1408210044	CHETAN KUMAR	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
42	1408210045	DEEPA CHAUDHARY	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
43	1408210046	DEEPA GUSAIN	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
44	1408210047	DEEPIKA MATHUR	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5
45	1408210048	DEVANGNA RASTOGI	4	5	3	2	5	4	3	5	4	3	4	3	5	5	5	4	5	3	5	4	4	5	3	2	5

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CO Attainment and Analysis

Direct CO Attainment using Continuous Internal Examination (CIE)

Course Code	CO	CO Attained (% of students getting ≥ 60% marks)	CO Attained (On Scale of 3)
NCS702	CO1	100	3
	CO2	96.61	2.9
	CO3	96.61	2.9
	CO4	100	3
	CO5	100	3

Direct CO Attainment using Semester End Examination (SEE)

Course Code	CO	CO Attained (% of students getting ≥ 60% marks)	CO Attained (On Scale of 3)
NCS702	CO1	20.34	0.61
	CO2	20.34	0.61
	CO3	20.34	0.61
	CO4	20.34	0.61
	CO5	20.34	0.61

Direct CO Attainment (CO_Direct)

Course Code	CO	CO Attained Using CIE (CO_CIE)	CO Attained using SEE (CO_SEE)	Direct CO Attainment (CO_Direct = 0.33*CO_CIE + 0.67*CO_SEE)	Direct CO Attainment (On Scale of 3)
NCS702	CO1	100	20.34	46.63	1.4
	CO2	96.61	20.34	45.51	1.37
	CO3	96.61	20.34	45.51	1.37
	CO4	100	20.34	46.63	1.4
	CO5	100	20.34	46.63	1.4

Indirect CO Attainment (CO_Indirect)

Course Code	CO	Indirect CO Attainment (CO_Indirect)	Indirect CO Attainment (On scale of 3)
NCS702	CO1	228.81	6.86
	CO2	228.81	6.86
	CO3	227.12	6.81
	CO4	227.12	6.81
	CO5	227.12	6.81

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CO Attainment

Course Code	CO	Direct CO Attainment (CO_Direct)	Indirect CO Attainment (CO_Indirect)	CO Attainment (CO = 0.9*CO_Direct+0.1*CO_Indirect)	CO Attainment (On scale of 3)	Y/N
NCS702	CO1	46.63	228.81	64.85	1.95	Y
	CO2	45.51	228.81	63.84	1.92	Y
	CO3	45.51	227.12	63.67	1.91	Y
	CO4	46.63	227.12	64.68	1.94	Y
	CO5	46.63	227.12	64.68	1.94	Y

Course Code	CO	CO Targets	CO Attainment	Y/N
NCS702	CO1	60	64.85	Y
	CO2	60	63.84	Y
	CO3	60	63.67	Y
	CO4	60	64.68	Y
	CO5	60	64.68	Y
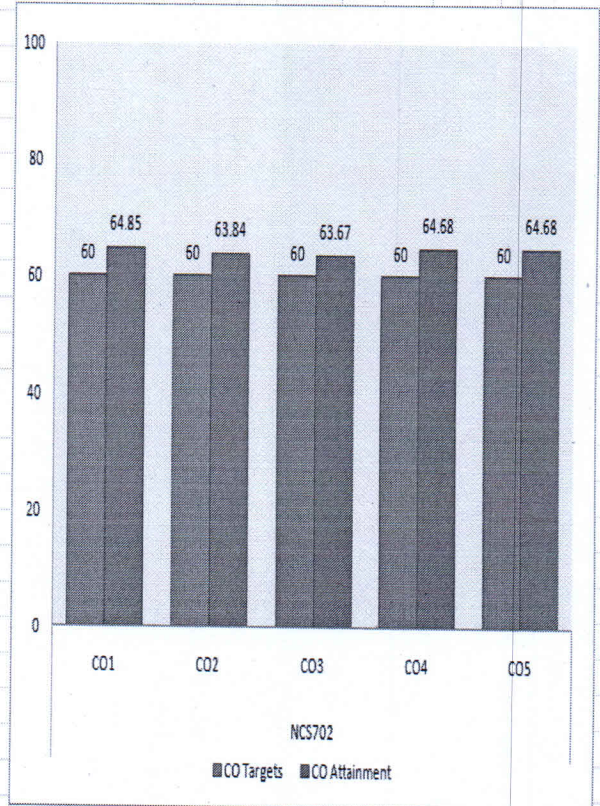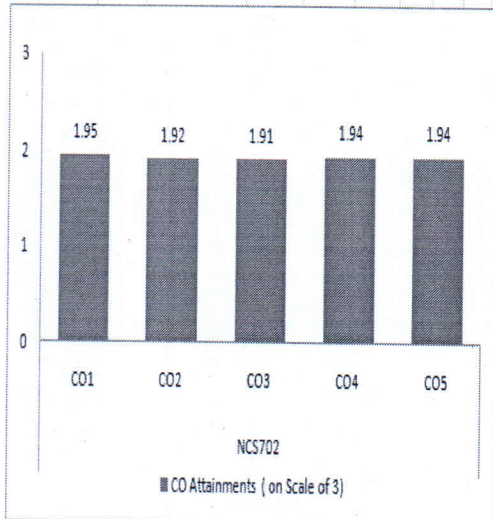
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CO Attainment Gap

Course Code	CO	CO Targets	CO Attainment	CO Attainment Gap (Target - Attainment)
NCS702	CO1	60	64.85	-4.85
	CO2	60	63.84	-3.84
	CO3	60	63.67	-3.67
	CO4	60	64.68	-4.68
	CO5	60	64.68	-4.68

If Gap > 0 : Target not attained

If Gap ≤ 0 : Target attained

Closure of Quality Loop

Course Code	CO	CO Targets	CO Attainment Gap	Action proposed to bridge the gap where targets are not achieved	Modification of targets where Achieved
NCS702	CO1	60	-4.85	Quiz sheet will be added in next offering of course	Target is increased to 62%
	CO2	60	-3.84	Quiz sheet will be added in next offering of course	Target is increased to 62%
	CO3	60	-3.67	Quiz sheet will be added in next offering of course	Target is increased to 62%
	CO4	60	-4.68	Quiz sheet will be added in next offering of course	Target is increased to 62%
	CO5	60	-4.68	Quiz sheet will be added in next offering of course	Target is increased to 62%

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Using PPT

Introduction to AI

Some Definitions

making computers that think?

the automation of activities we associate with human thinking, like decision making, learning ... ?

the study of computations that make it possible to perceive, reason and act ?

a branch of computer science that is concerned with the automation of intelligent behaviour ?

Artificial Intelligence is concerned with the design of intelligence in an artificial device.

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* Artificial Intelligence is concerned with the design of intelligence in an artificial device.
  There are two ideas in the definition.
  1. Intelligence
  2. artificial device

* What is intelligence?

  – Is it that which characterize humans? Or is there an absolute standard of judgement?
  – Accordingly there are two possibilities:
  – A system with intelligence is expected to behave as intelligently as a human
  – A system with intelligence is expected to behave in the best possible manner

---

* Secondly what type of behaviour are we talking about?
  – Are we looking at the thought process or reasoning ability of the system?
  – Or are we only interested in the final manifestations of the system in terms of its actions?

In General Intelligence implies that a machine must be able to adapt to new situations or ability to achieve human levels.

State Space Search Algorithms

State Space Search

Type of search

An uninformed search is a searching technique that has no additional information about the distance from the current state to the goal.

Informed Search is another technique that has additional information about the minimum distance from the current state to the goal.

Depth First Search

- Maintain stack of nodes to visit
- Properties
  - Complete?
  - Time Complexity?
  - Space Complexity?

Depth First Search

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Game Playing

Games vs. Search Problems

- Game playing is a search problem
- Defined by:
  - Initial state
  - Successor function
  - Goal test
  - Path cost /utility /payoff function
- Characteristics of game playing
  - "Unpredictable" opponent
    Solution is a strategy specifying a move for every possible opponent reply
  - Time limits:
    Unlikely to find goal, must approximate

Kinds of Games

- Deterministic
- Turn-taking
- 2-player
- Zero-sum
- Perfect information

Game Trees

- Game trees are used to represent two-player games.
- Alternate moves in the game are represented by alternate levels in the tree (plies).
- Nodes in the tree represent positions.
- Edges between nodes represent moves.
- Leaf nodes represent won, lost or drawn positions.

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Utility Theory

Utility Theory

Markov Model

Pattern Recognition

Pattern Recognition

Pattern Recognition

Pattern Recognition

Pattern Recognition

Introduction to Machine Learning

What We Talk About When We Talk About "Learning"

* Learning general models from a data of particular examples
* Data is cheap and abundant (data warehouses, data marts); knowledge is expensive and scarce.
* Example in retail: Customer transactions to consumer behavior:
  People who bought "Da Vinci Code" also bought "The Five People You Meet in Heaven" (www.amazon.com)
* Build a model that is a good and useful approximation to the data.

Why "Learn"?

* Machine learning is programming computers to optimize a performance criterion using example data or past experience.
* There is no need to "learn" to calculate payroll
* Learning is used when:
  * Human expertise does not exist (navigating on Mars),
  * Humans are unable to explain their expertise (speech recognition)
  * Solution changes in time (routing on a computer network)
  * Solution needs to be adapted to particular cases (user biometrics)

Data Mining/KDD (Knowledge Discovery in Databases)

Definition :- "KDD is the non-trivial process of identifying valid, novel, potentially useful, and ultimately understandable patterns in data"
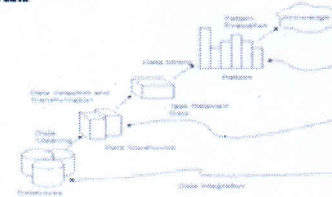
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Beyond The Syllabus(covered by Video Lecture)

Introduction to Robots and Robotics
https://www.youtube.com/watch?v=xrwz9IxpMJg&t=790s

Hill climbing
https://www.youtube.com/watch?v=ZOvRZ7UJMjk

k-Nearest Neighbour
https://www.youtube.com/watch?v=PNglugooJUQ

Genetic Algorithms
https://www.youtube.com/watch?v=Z_8MpZeMdD4

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