



Estd. 2001

Sri Indu

College of Engineering & Technology

UGC Autonomous Institution

Recognized under 2(f) & 12(B) of UGC Act 1956,

NAAC, Approved by AICTE &

Permanently Affiliated to JNTUH



NAAC

NATIONAL ASSESSMENT AND
ACCREDITATION COUNCIL



HANDOUT

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

ACADEMIC YEAR 2025-26

III YEAR- II SEM

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

HANDOUT- INDEX

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SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY

B. TECH –DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

INSTITUTION VISION

To be a premier Institution in Engineering & Technology and Management with competency, values and social consciousness.

INSTITUTION MISSION

- IM₁** Provide high quality academic programs, training activities and research facilities.
- IM₂** Promote Continuous Industry-Institute interaction for employability, Entrepreneurship, leadership and research aptitude among stakeholders.
- IM₃** Contribute to the economic and technological development of the region, state and nation.

DEPARTMENT VISION

To develop competent engineers in the domain of Artificial Intelligence and Machine Learning for noteworthy contributions to the society.

DEPARTMENT MISSION

The Department has following Missions:

- DM1:** To strengthen academic collaborations for better exposure.
- DM2:** Promote professional environment to imbibe ethical values and entrepreneurial skills
- DM3:** Encourage research & development by emphasizing on innovation
- DM4:** Facilitate Industry-Institute collaboration for mutual benefit

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- PEO 1:** Graduates with strong foundation in mathematical and core concepts, which enables them to participate in research, in the field of Computer Science.
- PEO 2:** Graduates with application development, problem solving skills by learning the computer programming methods of the industry and related domains.
- PEO 3:** Graduates with multidisciplinary knowledge by understanding the scope of association of computer science engineering along with other engineering disciplines.
- PEO 4:** Graduates with communication skills, soft skills, organizing skills which build the professional qualities understand the social responsibilities

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)

PO1	Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program specific Outcomes(PSOs)

PSO1	Software Development: To apply the knowledge of Software Engineering, Data Communication, Web Technology and Operating Systems for building IOT and Cloud Computing applications.
PSO2	Industrial Skills Ability: Design, develop and test software systems for world-wide network of computers to provide solutions to real world Problems.
PSO3	Project Implementation: Analyze and recommend the appropriate IT Infrastructure required for the implementation of a project.

COs MAPPING WITH POs & PSOs

COs Mapping with POs and PSOs

Knowledge Representation and Reasoning

Course Outcomes	Statements
C321.1	Learn theoretical knowledge about principles for logic-based representation and reasoning.
C321.2	Learn Knowledge Engineering basic, complex, Terminological facts and handling variables and quantifiers
C321.3	Has a basic understanding of Kripke models, production systems, frames, inheritance systems
C321.4	Learn approaches to handling uncertain or incomplete knowledge.
C321.5	Has a basic understanding of principles for reasoning with respect to explanation and planning.
C321.6	Has a broad understanding of how knowledge based systems work which provides a solid foundation for further studies and for assessing when knowledge based approaches to problem solving are appropriate.

Course Articulation Matrix

Course Outcomes	Program Outcomes (PO)											Program Specific Outcomes (PSO)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	1	-	-	-	-	1	2	2	1
CO2	3	2	2	1	2	1	-	-	-	-	2	3	3	2
CO3	3	2	2	2	3	1	-	-	-	-	2	3	3	3
CO4	3	3	3	3	3	2	2	-	-	-	2	3	3	3
CO5	2	3	3	3	3	2	2	-	-	-	3	3	3	3
CO6	3	3	3	3	2	2	2	-	-	-	3	2	3	3
AVG	2.8	2.7	2.5	2.2	2.5	1.5	1	0	0	0	2.2	2.7	2.8	2.5

ACADEMIC CALENDAR



SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY
(An Autonomous Institution under UGC, New Delhi)
Recognized under 2(f) and 12(B) of UGC Act 1956
NBA & NAAC Accredited, Approved by AICTE and Permanently affiliated to JNTUH
Sheriguda (V), Ibrahimpatnam, R.R. Dist, Hyderabad - 501 510

D4

BR-22

Lr.No.SICET/AUTO/DAE/III B.Tech Academic Calendar/29/2025

ANNEXURE -II

B.TECH III-YEAR I-SEM & II-SEM ACADEMIC CALENDAR (FOR ACADEMIC YEAR : 2025-26)

Academic Calendar for B.Tech – IIIrd Year Students (2023 - 24 Batch), BR-22 Regulation.

I – Semester

S.No.	EVENT	PERIOD	DURATION
1.	Commencement of class work.	14.07.2025 (Monday)	
2.	1 st Spell of Instructions for covering First Two and a half Units.	14.07.2025 – 13.09.2025	9 Weeks
3.	CRT Classes	15.09.2025 – 07.10.2025	2 Weeks 2 Days
4.	I Mid Term Examinations.	08.10.2025 – 10.10.2025	3 Days
5.	Submission of I Mid Term Examination Marks.	16.10.2025	
6.	2 nd Spell of Instructions for Remaining Two and a half Units.	13.10.2025 – 13.12.2025	9 Weeks
7.	II Mid Term Examinations.	15.12.2025 – 17.12.2025	3 Days
8.	Preparation Holidays and Practical Examinations	18.12.2025 – 27.12.2025	1 Week
9.	Submission of II Mid Term Examination Marks.	23.12.2025	
10.	I Semester End Examinations.	29.12.2025 – 10.01.2026	2 Weeks
Commencement of Class-Work for III B.Tech - II Semester 19.01.2026			

Note: No of Working/instructional days : 90

II – Semester

S.No.	EVENT	PERIOD	DURATION
1.	Commencement of class work.	19.01.2026 (Monday)	
2.	1 st Spell of Instructions for covering First Two and a half Units.	19.01.2026 – 14.03.2026	8 Weeks
3.	I Mid Term Examinations.	16.03.2026 – 18.03.2026	3 Days
4.	Submission of I Mid Term Examination Marks.	24.03.2026	
5.	2 nd Spell of Instructions for Remaining Two and a half Units.	20.03.2026 – 09.05.2026	7 Weeks
6.	Continuation of remaining 2 nd Spell of Instructions	25.05.2026 – 10.06.2026	2 Weeks
7.	II Mid Term Examinations.	11.06.2026 – 13.06.2026	3 Days
8.	Preparation Holidays and Project Evaluation.	15.06.2026 – 20.06.2026	1 Week
9.	Submission of II Mid Term Examination Marks.	18.06.2026	
10.	II Semester End Examinations	22.06.2026 – 04.07.2026	2 Weeks

Note: No of Working/instructional days : 93

ACE

CE

DIRECTOR

PRINCIPAL

Controller of Examination
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510

DIRECTOR
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510.

PRINCIPAL
Sri Indu College of Engineering & Technology
(An Autonomous Institution Under UGC)
Sheriguda (V), Ibrahimpatnam, R.R. Dist-501510

Sign:

Dr. M.V.S.S. Giridhar
Prof. of CEA; JNTUH Nominee

Sign:

Dr. T. Venu Gopal
Prof. of CSE; JNTUH Nominee

Sign:

Dr. D. Ramesh
Prof. of CSE; JNTUH Nominee

(Copy to DAP&E and Copy to all the Dept. Heads)

DEPARMENT CALENDAR

					Feb-26		Mar-26									
SUNDAY		Dec-25			1		1						Jun-26			
MONDAY	1				2		2					1				
TUESDAY	2				3	IYRCRT TRAINING	3	IYRCRT TRAINING		Apr-26		2	IYRTRAININ G	Jul-26		
WEDNESDAY	3			Jan-26	4		4	HOLI HOLIDAY	1			3		1	II-II&III-II SEM ENDEXAM S	
THURSDAY	4		1	NEWYEAR HOLIDAY	5		5		2	IYRTRAININ G		May-26	4	2	II-II&III-II SEM ENDEXAM S	
FRIDAY	5	AICLUBMEET ING	2		6	IYRCRT TRAINING	6	IYRCRT TRAINING	3	GOODERIDAY HOLIDAY	1	IV-IIMID II EXAMS	5	IYRTRAININ G	3	II-II&III-II SEM ENDEXAM S
SATURDAY	6	DEPARTMENT MEETING	3		7	AICLUBMEET ING	7		4	AICLUBMEET ING	2	IV-IIMID II EXAMS	6		4	II-II&III-II SEM ENDEXAM S
SUNDAY	7	HOLIDAY	4	HOLIDAY	8	HOLIDAY	8	HOLIDAY	5	HOLIDAY	3	HOLIDAY	7	HOLIDAY	5	HOLIDAY
MONDAY	8		5		9		9		6		4	IV-II PREPARATIO NHOLIDAYS	8		6	
TUESDAY	9		6		10	II YR CRTTR AININ G	10	II YR CRTTR AININ G	7	IYRTRAININ G	5	IV-II PREPARATIO NHOLIDAYS	9		7	
WEDNESDAY	10		7		11		11		8		6	IV-II PREPARATIO NHOLIDAYS	10		8	
THURSDAY	11		8		12		12		9		7	SUBMISSIO NOF MID- IIMARKS	11	II-II&III- IIMIDIE XAM	9	
FRIDAY	12		9		13	II YR CRTTR AININ G	13	II YR CRTTR AININ G	10	IYRTRAININ G	8	IV-II PREPARATIO NHOLIDAYS	12	II-II&III- IIMIDIE XAM	10	
SATURDAY	13		10	DEPARTM ENTMEET ING	14		14		11	DEPARTM ENTMEET ING	9	IV-II PREPARATIO NHOLIDAYS	13	II-II&III- IIMIDIE XAM	11	DEPARTM ENTMEET ING
SUNDAY	14	HOLIDAY	11	HOLIDAY	15	HOLIDAY	15	HOLIDAY	12	HOLIDAY	10	HOLIDAY	14	HOLIDAY	12	HOLIDAY
MONDAY	15	IV- IICOMMENCE MENTWORK	12		16	IV- IIMIDIE XAM	16	II&III- IIMIDIE XAM	13		11	IV- IISEMEXAMS	15	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	13	
TUESDAY	16		13	PONG ALHOL IDAYS	17	IV-II MID IEXAM& IYRTRA INING	17	II&III- IIMIDIE XAM, IYRTRAININ G	14	DR.AMBEDK ARJAYANTIH OLIDAY	12	IV- IISEMEXAMS	16	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	14	
WEDNESDAY	17		14	PONG ALHOL IDAYS	18	IV- IIMIDIE XAM	18	II&III- IIMIDIE XAM	15		13	IV- IISEMEXAMS	17	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	15	
THURSDAY	18		15	PONG ALHOL IDAYS	19	IV- IIMIDIE XAM	19		16		14	IV- IISEMEXAMS	18	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	16	
FRIDAY	19		16	PONG ALHOL IDAYS	20	II YR CRTTR AININ G	20	II -II & III- II/ IISPELLINS TRUCTIONS	17	IYRTRAININ G	15	IV- IISEMEXAMS,	19	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	17	
SATURDAY	20		17	PONG ALHOL IDAYS	21		21		18		16	IV- IISEMEXAMS	20	II-II&III- IPREPHOIL DAYS&PROJ ECT EVALUATIO N	18	
SUNDAY	21	HOLIDAY	18	HOLIDAY	22	HOLIDAY	22	HOLIDAY	19	HOLIDAY	17	HOLIDAY	21	HOLIDAY	19	HOLIDAY
MONDAY	22		19	II&III-II COMMENCEM ENTWORK	23		23		20		18		22	II-II&III- IISEMEN DEXAMS	20	
TUESDAY	23		20		24	SUBMISSIONO F IV-II MID IMARKS, IYRTRA INING	24	SUBMISSION OF III- IIMIDIMARK S	21	IYRTRAININ G	19	IYRTRAININ G	23	II-II&III- IISEMEN DEXAMS	21	

SYLLABUS

BR22 – B.TECH. – CSE(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

SRI INDU COLLEGE OF ENGINEERING & TECHNOLOGY (An Autonomous Institution under UGC, New Delhi)

B.Tech. - III Year – II Semester

L T P C
3 0 0 3

(R22CSM3211) KNOWLEDGE REPRESENTATION AND REASONING

Course Objectives

- To introduce the principles of logic-based knowledge representation and reasoning
- To understand symbolic approaches to representing and reasoning about knowledge such as production systems, frames, taxonomies.
- How to represent different sorts of knowledge, such as uncertain or incomplete knowledge, knowledge about action and change, and knowledge about default situations.

Course outcomes

- At the end of the course, the student will be able to:
- Learn theoretical knowledge about principles for logic-based representation and reasoning.
- Has a basic understanding of Kripke models, production systems, frames, inheritance systems and approaches to handling uncertain or incomplete knowledge.
- Has a basic understanding of principles for reasoning with respect to explanation and planning.
- Has a broad understanding of how knowledge based systems work which provides a solid foundation for further studies and for assessing when knowledge based approaches to problem solving are appropriate.

UNIT-I

Introduction: The Key Concepts: Knowledge, Representation, and Reasoning, The Role of Logic, The Language of First-Order Logic: The Syntax, Semantics: Interpretations, Denotation, Satisfaction and Models, Pragmatics: Logical Consequence, Explicit and Implicit Belief.

Unit II

Expressing Knowledge: Knowledge Engineering, Vocabulary, Basic Facts, Complex Facts, Terminological Facts, Entailments, Abstract Individuals, Other Sorts of Facts.

Resolution: The Propositional Case, Handling Variables and Quantifiers, Dealing with Computational Intractability.

Unit III

Reasoning with Horn Clauses: Horn Clauses, SLD Resolution, Computing SLD Derivations: Backward Chaining, Forward Chaining, The First-Order Case.

Procedural Control of Reasoning: Facts and Rules, Rule Formation and Search Strategy, Algorithm Design, Specifying Goal Order, Committing to Proof Methods, Controlling Backtracking, Negation as Failure, Dynamic Databases.

Unit IV

Rules in Production Systems: Production Systems: Basic Operation, Working Memory, Production Rules, A First Example, A Second Example, Conflict Resolution, Making Production Systems More Efficient, Applications and Advantages, Some Significant Production Rule Systems.

Object-Oriented Representation: Objects and Frames, A Basic Frame Formalism, An Example: Using Frames to Plan a Trip, Extensions to the Frame Formalism, Object-Driven Programming with Frames.

17/1/25

Unit V

Structured Descriptions: Descriptions: Noun Phrases, Concepts, Roles, and Constants, **Description Language, Meaning and Entailment:** Interpretations, Truth in an Interpretation, Entailment, **Computing Entailments:** Simplifying the Knowledge Base, Normalization, Structure Matching, The Correctness of the Subsumption Computation, Computing Satisfaction.

Taxonomies and, Classification: A Taxonomy of Atomic Concepts and Constants, Computing Classification, Taxonomies versus Frame Hierarchies, Inheritance and Propagation.

Textbook

1. Ronald Brachman, Hector Levesque, Knowledge Representation and Reasoning, Elsevier Science, 2004.
2. Hector J. Levesque, Gerhard Lakemeyer, The Logic of Knowledge Bases, MIT Press, 2001

Reference:

1. Michael L. Brodie, John Mylopoulos, On Knowledge Base Management Systems: Integrating Artificial Intelligence and Database Technologies, Springer New York, 2012

LESSON PLAN

	SRI INDU COLLEGE OF ENGG & TECH LESSON PLAN (Regulation :R22) DEPARTMENT OF ARTIFICIAL INTELLIGENCE & MACHINE LEARNING		Prepared on Rev1: 21.01.26	
	Sub. Code & Title	R22CSM3211- Knowledge Representation and Reasoning		
	Academic Year: 2025-26	Year/Sem./Section	III-II	
	Faculty Name & Designation	P.Himabindu,Asst.Prof		

Item No.	Topic (s)	Book Reference	Page (s)		Teaching Methodology	Proposed No. of Periods	Actual Date of Handled	CO/RBT
			From	To				
I	UNIT-I Introduction					08		
1.1	The Key Concepts: Knowledge, Representation, and Reasoning	T1	1	2	Black board	01		CO1, L2
1.2	The Role of Logic	T1	11	12	Black board	01		CO1, L2
1.3	The Language of FOL: The Syntax	T1	15	16	Black board	01		CO1, L2
1.4	Semantics: Interpretations	T1	18	20	Black board	01		CO1, L2
1.5	Denotation	T1	21		Black board	01		CO1, L4
1.6	Satisfaction and Models	T1	22		Black board	01		CO1, L4
1.7	Pragmatics: Logical Consequence	T1	22	23	Black board	01		CO1, L4
1.8	Explicit and Implicit Belief	T1	25	27	Black board	01		CO1, L4
II	UNIT – II Expressing Knowledge					12		
2.1	Knowledge Engineering	T1	31		Black board	01		CO2
2.2	Vocabulary	T1	32		Black board	01		CO2
2.3	Basic Facts, Complex Facts	T1	33	34	Black board	01		CO2
2.4	Terminological Facts	T1	36		Black board	01		CO2
2.5	Entailments	T1	37	40	Black board	01		CO2
2.6	Abstract Individuals	T1	41	42	Black board	01		CO2
2.7	Other Sorts of Facts	T1	43		Black board	01		CO2
2.8	Resolution: The Propositional Case	T1	50	53	Black board	01		CO2
2.9	Handling Variables and Quantifiers	T1	55	64	Black board	02		CO2
2.10	Dealing with Computational Intractability	T1	67	71	Black board	02		CO2
III	UNIT – III Reasoning with Horn Clauses					12		
3.1	Horn Clauses	T1	85	86	Black board	01		CO3
3.2	SLD Resolution	T1	87	89	Black board	01		CO3
3.3	Computing SLD Derivations: Backward Chaining	T1	91		Black board	01		CO3
3.4	Forward Chaining	T1	93		Black board	01		CO3
3.5	The First-Order Case	T1	94		Black board	01		CO3
3.6	Procedural Control of Reasoning: Facts and Rules	T1	100		Black board	01		CO3
3.7	Rule Formation and Search Strategy	T1	101		PPT	01		CO3
3.8	Algorithm Design ,Specifying Goal Order	T1	102	103	PPT	01		CO3
3.9	Committing to Proof Methods	T1	104	105	PPT	01		CO3
3.10	Controlling Backtracking	T1	106	107	Black board	01		CO3
3.11	Negation as Failure	T1	108	109	Black board	01		CO3

3.12	Dynamic Databases	T1	110	111	Black board	01		CO3
IV	UNIT - IV Rules in Production Systems					12		
4.1	Production Systems: Basic Operation ,Working Memory	T1	118	119	Black board	01		CO4
4.2	Production Rules	T1	120	121	Black board	01		CO4
4.3	A First Example	T1	122	124	Black board	01		CO4
4.4	A Second Example	T1	125		Black board	01		CO4
4.5	Conflict Resolution	T1	126		Black board	01		CO4
4.6	Making Production Systems More Efficient	T1	127	128	Black board	01		CO4
4.7	Applications and Advantages ,Some Significant Production Rule Systems	T1	129	131	Black board	01		CO4
4.8	Object-Oriented Representation: Objects and Frames	T1	135		Black board	01		CO4
4.9	A Basic Frame Formalism	T1	136	140	Black board	01		CO4
4.10	An Example: Using Frames to Plan a Trip	T1	141	145	Black board	01		CO4
4.11	Extensions to the Frame Formalism	T1	150		Black board	01		CO4
4.12	Object-Driven Programming with Frames	T1	151		Black board	01		CO4
V	UNIT - V Structured Descriptions					13		
5.1	Descriptions: Noun Phrases, Concepts	T1	156		Black board	01		CO5
5.2	Roles, and Constants	T1	157		Black board	01		CO5
5.3	Description Language	T1	158		Black board	01		CO5
5.4	Meaning and Entailment: Interpretations	T1	160		Black board	01		CO5
5.5	Truth in an Interpretation, Entailment	T1	161		Black board	01		CO5
5.6	Computing Entailments: Simplifying the Knowledge Base	T1	163	164	Black board	01		CO5
5.7	Normalization, Structure Matching	T1	165	167	Black board	01		CO5
5.8	The Correctness of the Subsumption Computation	T1	168		Black board	01		CO5
5.9	Computing Satisfaction	T1	169		Black board	01		CO5
5.10	Taxonomies and, Classification: A Taxonomy of Atomic Concepts and Constants	T1	171	172	Black board	01		CO5
5.11	Computing Classification	T1	173		Black board	01		CO5
5.12	Taxonomies versus Frame Hierarchies	T1	175		Black board	01		CO5
5.13	Inheritance and Propagation	T1	176		Black board	01		CO5
	Review	Signature of the HOD/Coordinator						

LIST OF TEXT BOOKS AND REFERENCES

Textbook

1. Ronald Brachman, Hector Levesque, Knowledge Representation and Reasoning, Elsevier Science, 2004.
2. Hector J. Levesque, Gerhard Lakemeyer, The Logic of Knowledge Bases, MIT Press, 2001

Reference:

1. Michael L. Brodie, John Mylopoulos, On Knowledge Base Management Systems: Integrating Artificial Intelligence and Database Technologies, Springer New York, 2012

QUESTION BANK

	SRI INDU COLLEGE OF ENGG & TECH QUESTION BANK (Regulation :R22) Department of Artificial Intelligence and Machine Learning		(Regulation:R22) Prepared on Rev1: Page: 1of 5
	Sub. Code & Title	R22CSM3211- Knowledge Representation and Reasoning	
	Academic Year : 2025 - 26	Year/Sem	III/II
	Faculty Name & Designation		P.Himabindu,Asst Professor

QUESTION BANK WITH BLOOMS TAXONOMY LEVEL (BTL)

(1. REMEMBERING 2. UNDERSTANDING 3. APPLYING 4. ANALYSING 5. EVALUATING

6. CREATING)

UNIT – I			
OBJECTIVE QUESTIONS			
SL.NO		BT Level	Course Outcome
1C - 1	Which of the following is NOT a key concept in knowledge representation? a) Knowledge b) Representation c) Reasoning d) Compilation	IV	CO1
1C - 2	Logic is primarily used in AI for: a) Image processing b) Knowledge representation and reasoning c) Data compression d) Signal transmission	I	CO1
1C - 3	Which of the following best describes First-Order Logic (FOL)? a) A logical system that only uses propositional variables b) A system that includes objects, functions, and predicates c) A type of machine learning algorithm d) A data encryption technique	II	CO1
1C - 4	In First-Order Logic, which of the following is used to refer to specific objects? a) Predicates b) Constants c) Logical operators d) Quantifiers	I	CO1
1C - 5	The interpretation of a logical expression in First-Order Logic depends on: a) The hardware used b) The model and domain of discourse c) The type of programming language d) The number of logical operators used	I	CO1
1C - 6	What is meant by "satisfaction" in First-Order Logic? a) The process of resolving contradictions b) A condition where an interpretation makes a formula true c) The ability to prove a theorem d) The process of learning new knowledge	I	CO1
1C - 7	A "model" in First-Order Logic is: a) A set of rules used for inference b) An interpretation where all given statements are true c) A neural network representation of knowledge d) A machine-learning training dataset	II	CO1
1C - 8	First-Order Logic is more expressive than Propositional Logic. (True/False)	II	CO1
1C - 9	Logical consequence refers to: a) The conclusion that logically follows from given premises b) The set of independent facts in a knowledge base c) The negation of a given proposition	I	CO1

	d) A randomly inferred statement		
1C - 10	Explicit belief is always directly stored in a knowledge base. (True/False)	II	CO1
1C - 11	In First-Order Logic, which of the following is used to express generality? a) Constants b) Functions c) Quantifiers d) Connectives	I	CO1
1C - 12	Which of the following statements is TRUE about explicit and implicit belief? a) Explicit belief is inferred from implicit belief b) Implicit belief is always stored in a knowledge base c) Explicit belief is assumed without evidence d) Implicit belief is directly represented in logic	I	CO1
1C - 13	In First-Order Logic, the term "denotation" refers to: a) The relationship between symbols and their meanings b) A special type of inference rule c) The logical equivalence of two formulas d) The process of contradiction resolution	I	CO1
1C - 14	Which of the following best describes logical entailment? a) A rule that modifies the syntax of logical statements b) A relation where one statement logically follows from another c) A contradiction in logical reasoning d) A process of storing explicit beliefs	IV	CO1
1C - 15	The syntax of First-Order Logic defines how symbols can be combined, while semantics defines their meaning. (True/False)	II	CO1
FILL IN THE BLANKS			
1F - 1	_____ is the process of encoding real-world information into a form that a computer system can process.	I	CO1
1F - 2	In artificial intelligence, _____ is used to derive new knowledge from existing facts.	I	CO1
1F - 3	First-Order Logic (FOL) consists of _____, which refer to objects, and _____, which describe relationships between objects.	I	CO1
1F - 4	The _____ of First-Order Logic defines the structure and rules for forming valid expressions.	I	CO1
1F - 5	An interpretation in logic assigns meanings to _____, _____, and _____ in a given domain.	I	CO1
1F - 6	A _____ in First-Order Logic is an interpretation in which all given statements are true.	I	CO1
1F - 7	Logical consequence means that if a set of premises is true, then the _____ must also be true.	II	CO1
1F - 8	_____ belief refers to knowledge explicitly stated in a knowledge base, whereas _____ belief refers to knowledge inferred from existing information.	I	CO1
1F - 9	The relationship between symbols and their meanings in First-Order Logic is called _____.	I	CO1
1F - 10	_____ is a condition in which a formula is satisfied by an interpretation in a given model.	I	CO1
1F - 11	The _____ of logic focuses on the relationship between symbols and their use in the reasoning process.	I	CO1
1F - 12	In First-Order Logic, _____ are used to quantify over variables, either stating that "some" or "all" elements of a domain satisfy a given condition.	II	CO1
1F - 13	The _____ of a logical statement determines its truth value within a particular model or interpretation.	I	CO1
1F - 14	_____ Reasoning is a method of deriving conclusions by starting from a goal and working backward through known facts.	I	CO1
1F - 15	In First-Order Logic, _____ refers to the process of assigning a meaning to a symbol or expression based on a model or interpretation.	II	CO1
MATCH THE FOLLOWING			
1M - 1	A) Knowledge Representation a) The process of checking whether a formula is true in a given model B) Syntax of First-Order Logic b) A formal language for representing objects, relationships, and functions C) Pragmatics c) The assignment of meaning to terms in a specific domain D) Satisfaction d) Deals with the use of symbols and how they contribute to reasoning	I	CO1

1M - 2	A) Implicit Belief B) Logical Symbols C) Non-Logical Symbols D) Semantics	a) Connectives b) Interpretation c) Knowledge inferred from existing information, not explicitly stated d) Predicates	I	CO1
1M - 3	A) First-Order Logic B) Explicit Belief C) Denotation D) Logical Consequence	a) The relationship between symbols and their meanings in a model b) The conclusion that logically follows from a set of premises c) A formal logical system that includes objects, functions, and predicates d) Knowledge directly stated in a knowledge base	I	CO1
1M - 4	A) Interpretation in First-Order Logic B) Model in Logic C) Reasoning D) Quantifiers	a) The condition where a formula is true in a given model b) A specific assignment of meaning to terms in a domain c) The process of drawing conclusions from facts and rules d) Symbols used to specify generality in logical expressions	I	CO1
5 – MARKS QUESTIONS				
1D - 1	Explain the key concepts of knowledge, representation, and reasoning. How do these concepts interact in artificial intelligence?		II	CO1
1D - 2	Discuss the role of logic in knowledge representation and reasoning. Why logic is considered a fundamental tool in artificial intelligence?		II	CO1
1D - 3	Explain the concept of interpretations in First-Order Logic. How do interpretations help in defining the semantics of logical expressions?		II	CO1
1D - 4	Define and differentiate between denotation, satisfaction, and models in the context of First-Order Logic. Provide suitable examples.		IV	CO1
1D - 5	What is meant by logical consequence in First-Order Logic? Explain it with an example.		I	CO1
1D - 6	Compare and contrast the semantic and pragmatic aspects of First-Order Logic. How do they contribute to effective reasoning?		V	CO1
1D - 7	Discuss the importance of knowledge representation in artificial intelligence. How does it impact reasoning and decision-making?		II	CO1
1D - 8	Explain the role of formal logic in artificial intelligence. How does it contribute to automated reasoning?		II	CO1
1D - 9	What is the significance of domain interpretation in First-Order Logic? How does it affect the truth value of logical statements?		I	CO1
1D - 10	Define and explain the concept of satisfaction in First-Order Logic. How does it relate to model theory?		III	CO1
1D - 11	Differentiate between logical entailment and inference. How does soundness and completeness relate to these concepts?		IV	CO1
1D - 12	Discuss the role of explicit and implicit beliefs in reasoning systems. How can implicit belief be inferred from explicit knowledge?		II	CO1
1D - 13	Explain about the languages of FOL in knowledge representation.		II	CO1
1D - 14	What is meant by Pragmatics? Discuss how it relates to inference and entailment.		I	CO1
1D - 15	Explain the role of syntax in FOL. Discuss about the symbols that can be used in syntax.		III	CO1

UNIT – II			
OBJECTIVE QUESTIONS			
SL.NO		BT Level	Course Outcome
2C - 1	What is the process of designing, building, and maintaining systems to represent and reason with knowledge called? A) Knowledge Discovery	I	CO2

	B) Knowledge Engineering C) Data Analysis D) Machine Learning		
2C - 2	Which of the following represents a simple, atomic statement about the world? A) "If it rains, then the ground is wet." B) "The sky is blue." C) "A mammal is a warm-blooded vertebrate." D) "Socrates is mortal because he is human."	II	CO2
2C - 3	What type of fact provides definitions or descriptions of terms in a domain? A) Basic Facts B) Complex Facts C) Terminological Facts D) Probabilistic Facts	I	CO2
2C - 4	What is the term for conclusions that logically follow from given premises? A) Vocabulary B) Resolution C) Entailments D) Abstract Individuals	I	CO2
2C - 5	In propositional logic, which method simplifies and deduces truths by combining clauses? A) Resolution B) Classification C) Unification D) Skolemization	I	CO2
2C - 6	What is the term for managing variables and quantifiers in first-order logic? A) Quantifier Elimination B) Clause Resolution C) Handling Variables and Quantifiers D) Ontology Management	I	CO2
2C - 7	What is skolemization used for in logic? A) Converting first-order logic to propositional logic B) Eliminating existential quantifiers by introducing Skolem functions C) Simplifying search spaces in reasoning D) Building vocabularies for a domain	I	CO2
2C - 8	Which approach is NOT commonly used to deal with computational intractability? A) Heuristics B) Approximation methods C) Infinite-depth search D) Limiting search spaces	II	CO2
2C - 9	What is the set of terms used to represent entities, actions, properties, and relationships in a domain called? A) Vocabulary B) Ontology C) Terminology D) Knowledge Base	I	CO2
2C - 10	Which of the following is an example of an abstract individual? A) A physical object like a chair B) A specific location like Paris C) A mathematical concept like a triangle D) A natural phenomenon like lightning	I	CO2
2C - 11	What kind of facts combine basic facts using logical connectives like AND, OR, and NOT? A) Basic Facts B) Terminological Facts C) Complex Facts D) Probabilistic Facts	I	CO2
2C - 12	If "All birds have wings" and "A penguin is a bird" are given, which of the following can be entailed? A) Penguins do not have wings	III	CO2

	B) Penguins have wings C) Not all birds have wings D) Wings are optional for birds		
2C - 13	Which of the following terms describes the process of finding a substitution to make two logical expressions identical? A) Entailment B) Unification C) Quantifier Elimination D) Simplification	II	CO2
2C - 14	What is the main challenge in dealing with computational intractability in knowledge representation? A) Finding consistent vocabularies B) Managing limited storage capacity C) Exponential growth in complexity D) Resolving semantic ambiguities	I	CO2
2C - 15	In propositional logic, what is the primary goal of resolution? A) To create complex facts from basic facts B) To prove logical contradictions or derive conclusions C) To eliminate all variables from logical expressions D) To define terminological facts	II	CO2

FILL IN THE BLANKS

2F - 1	The process of designing, building, and maintaining systems to represent and reason with knowledge is called _____.	I	CO2
2F - 2	A well-defined set of terms used to represent entities, properties, and relationships in a domain is referred to as _____.	I	CO2
2F - 3	Definitions or descriptions of terms in a domain are called _____ facts.	I	CO2
2F - 4	_____ are conclusions that logically follow from a given set of premises.	I	CO2
2F - 5	Entities that are not physical but conceptual, like mathematical objects, are known as _____ individuals.	I	CO2
2F - 6	In propositional logic, the process of deducing truths by combining clauses is called _____.	II	CO2
2F - 7	The process of finding substitutions to make two logical expressions identical is called _____.	I	CO2
2F - 8	_____ is a method used in first-order logic to eliminate existential quantifiers by introducing Skolem functions.	I	CO2
2F - 9	Strategies such as heuristics, approximation, and limiting search spaces are used to handle _____ intractability.	I	CO2
2F -10	In first-order logic, managing _____ and quantifiers is essential for reasoning and inference.	I	CO2
2F -11	A combination of basic facts using logical connectives like AND, OR, and NOT is called a _____ fact.	II	CO2
2F -12	The primary goal of _____ in propositional logic is to derive conclusions or prove contradictions.	I	CO2
2F -13	_____ facts represent simple, atomic statements about the world, such as "The sun rises in the east."	III	CO2
2F -14	Eliminating existential quantifiers in logical expressions involves introducing _____ functions.	I	CO2
2F -15	Logical reasoning often becomes computationally expensive due to the _____ growth in complexity of search spaces.	II	CO2

MATCH THE FOLLOWING

2M - 1	A) Knowledge Engineering B) Vocabulary C) Basic Facts D) Complex Facts	a) Information about abstract concepts b) Designing and building knowledge systems c) Combination of basic facts d) Set of terms for representing entities	I	CO2
2M - 2	A) Resolution B) Handling Variables and Quantifiers C) Terminological Facts D) Entailments	a) Managing variables and quantifiers b) Propositional logic technique for deduction c) Logical consequences of given statements d) Framework for building intelligent systems	I	CO2

2M - 3	A)Abstract Individuals B)Computational Intractability C)Skolemization D)Basic Facts	a)Simple, atomic statements b)Non-physical conceptual entities c)Relationships involving terms & meanings d)Eliminating existential quantifiers	I	CO2
2M - 4	A) Logical Consistency B) Unification C) Knowledge Representation D)Logical Connectives	a) Making logical expressions identical b) Structuring and storing knowledge c) AND, OR, NOT d)Ensuring coherence within a set of statements	I	CO2

5 – MARKS QUESTIONS

2D -1	What is knowledge engineering? Discuss its significance in artificial intelligence and knowledge representation.	I	CO2
2D - 2	Explain the importance of vocabulary in knowledge engineering. How does a well-defined vocabulary contribute to effective knowledge representation?	II	CO2
2D - 3	Differentiate between basic facts, complex facts, and terminological facts in knowledge representation. Provide suitable examples for each.	IV	CO2
2D - 4	What is entailment in logic? Explain its role in reasoning systems with examples.	I	CO2
2D - 5	Define abstract individuals in the context of knowledge representation. How are they used in logical reasoning?	I	CO2
2D - 6	Discuss different sorts of facts in knowledge representation. How do they influence reasoning and decision-making?	IV	CO2
2D - 7	Explain the concept of resolution in propositional logic.	I	CO2
2D - 8	How does resolution work when handling variables and quantifiers in First-Order Logic? Illustrate with an example.	V	CO2
2D - 9	Discuss the challenges posed by computational intractability in logical reasoning. What are some strategies used to address these challenges?	II	CO2
2D - 10	Compare and contrast propositional resolution with First-Order resolution. What are the key differences in their application?	V	CO2
2D - 11	Explain the role of terminological facts in knowledge representation. How do they differ from assertion facts?	III	CO2
2D - 12	How do entailments help in deriving new knowledge from existing facts? Provide examples to support your explanation.	I	CO2
2D - 13	Discuss the importance of handling variables and quantifiers in resolution. How does this impact logical inference?	III	CO2
2D - 14	What are some common techniques used to deal with computational intractability in automated reasoning systems?	I	CO2
2D - 15	Describe how abstract individuals are represented in knowledge engineering. Why are they important for reasoning in AI systems?	II	CO2

UNIT – III

OBJECTIVE QUESTIONS

SL.NO		BT Level	Course Outcome
3C - 1	What is a Horn clause? a) A clause with exactly two literals b) A clause with at most one positive literal c) A clause with only negative literals d) A clause with at least one positive literal	I	CO3
3C - 2	Which reasoning strategy is primarily used in SLD Resolution? a) Forward chaining b) Backward chaining c) Resolution refutation d) First-order unification	II	CO3
3C - 3	What does SLD stand for in SLD Resolution? a) Selective Linear Definite Clause Resolution b) Sequential Logic Deduction c) Simplified Logical Deduction d) Structured Logical Derivation	I	CO3
3C - 4	Which method is more suitable for deriving consequences in a knowledge	IV	CO3

	base? a) Forward chaining b) Backward chaining c) Negation as failure d) Dynamic databases		
3C - 5	In computing SLD derivations, backward chaining focuses on: a) Starting from known facts b) Determining the goal first c) Evaluating all possible outcomes d) Exploring all rules exhaustively	II	CO3
3C - 6	What are facts in the context of procedural reasoning? a) Rules that depend on variables b) Statements that are always true c) Statements used to trigger algorithms d) Temporary rules for dynamic databases	I	CO3
3C - 7	What is the purpose of controlling backtracking in reasoning? a) To evaluate all possible solutions b) To limit the search space and improve efficiency c) To ensure the accuracy of dynamic databases d) To avoid negation as failure	I	CO3
3C - 8	Negation as failure is a reasoning method where: a) Negative facts are treated as false b) Failure to prove a statement implies its negation c) Contradictions are automatically resolved d) All rules are exhaustively evaluated	III	CO3
3C - 9	Dynamic databases in reasoning refer to: a) Static facts stored permanently b) Rules that change during reasoning c) Temporary knowledge stores for computation d) Fully logical knowledge bases	I	CO4
3C - 10	In procedural reasoning, specifying goal order helps to: a) Avoid logical inconsistencies b) Prioritize rules based on efficiency c) Determine which proofs are computationally viable d) Decide the sequence of sub-goals for evaluation	II	CO4
3C - 11	What is the key goal of algorithm design in reasoning systems? a) Defining facts explicitly b) Optimizing computational processes c) Avoiding the use of negation d) Adding new rules dynamically	I	CO4
3C - 12	Rule formation in procedural reasoning involves: a) Defining fixed goals and strategies b) Structuring conditional statements to infer knowledge c) Limiting the scope of reasoning d) Ensuring rules are forward-chaining only	I	CO4
3C - 13	What does forward chaining focus on in reasoning systems? a) Starting from a goal and working backward b) Starting from known facts and applying rules to infer conclusions c) Exploring all possible solutions exhaustively d) Dynamically updating rules during execution	I	CO4
3C - 14	Which procedural reasoning strategy involves committing to proof methods early? a) Rule formation b) Controlling backtracking c) Specifying goal order d) Algorithm design	II	CO4
3C - 15	Negation as failure is most closely associated with: a) Horn clause resolution b) Prolog-based systems	II	CO4

	c) Forward chaining d) Dynamic rule creation		
FILL IN THE BLANKS			
3F - 1	A _____ clause is a clause that contains at most one positive literal.	I	CO3
3F - 2	SLD Resolution stands for _____ Clause Resolution.	II	CO3
3F - 3	_____ chaining starts with known facts and applies rules to derive conclusions, while _____ chaining begins with a goal and works backward to find supporting facts.	III	CO3
3F - 4	In reasoning systems, _____ as _____ is a method where failure to prove a statement implies its negation.	II	CO3
3F - 5	Dynamic databases allow _____ and _____ of rules during reasoning.	I	CO3
3F - 6	The primary goal of controlling _____ in procedural reasoning is to reduce computational overhead and improve efficiency.	I	CO3
3F - 7	_____ rules in procedural reasoning are conditional statements used to infer knowledge from given facts.	I	CO3
3F - 8	In the context of reasoning, specifying _____ ensures that sub-goals are evaluated in a logical and efficient sequence.	I	CO3
3F -9	_____ chaining is typically used for real-time applications where immediate data processing is necessary.	I	CO4
3F -10	The process of _____ involves creating strategies for processing logical queries and ensuring efficient computation.	I	CO4
3F -11	In procedural reasoning, _____ is a strategy to prioritize rules or subgoals during execution.	I	CO4
3F -12	The _____ case in resolution involves handling propositional logic without quantifiers.	III	CO4
3F -13	SLD derivations are commonly used in _____-based systems for logical reasoning.	I	CO4
3F -14	_____ chaining is goal-driven, starting from the desired conclusion and working backward to find supporting evidence.	I	CO4
3F -15	The process of _____ involves specifying a method to evaluate logical queries and produce proof efficiently.	III	CO4
MATCH THE FOLLOWING			
3M - 1	A)Horn Clause systems B)SLD C)Forward Chaining D)Backward Chaining	a)Commonly used in Prolog-based reasoning b) Resolution Backward-chaining logic c)A clause with at most one positive literal d)Starts reasoning from facts to infer conclusions	I CO3
3M - 2	A)Negation as Failure B)Dynamic Databases C)Controlling Backtracking D) Rule Formation	a)Structuring conditional statements for reasoning b)Reduces unnecessary exploration of search space c)Failure to prove implies the statement's negation d)Allows modification of facts and rules	I CO3
3M - 3	A)Algorithm Design B)Goal Order C)Procedural Control D)First-Order Case	a)Involves reasoning with variables and b) Ensures efficient execution of reasoning tasks c) Specifies the sequence for evaluating sub goals d)Managing facts, rules, and reasoning strategies	I CO4
3M - 4	A)Query Processing B)Declarative Knowledge C)Logical Unification D)Prolog	a)Programming language based on logic and Inference b) Making two logical expressions identical c)Information represented as facts and rules d)Mechanism to evaluate and retrieve logical	I CO4
5 – MARKS QUESTIONS			
3D -1	What are Horn Clauses? Explain their significance in logic programming and automated reasoning	I	CO3
3D - 2	Describe the process of SLD resolution. How does it differ from general resolution in logic?	III	CO3

3D - 3	Explain the difference between backward chaining and forward chaining. In what scenarios is each approach preferred?	IV	CO3
3D - 4	Discuss how SLD derivations are computed using backward chaining. Provide an example to illustrate the process.	II	CO3
3D - 5	Explain how forward chaining is used to compute SLD derivations. What are its advantages and limitations?	V	CO3
3D - 6	How does First-Order Logic extend SLD resolution beyond propositional logic? Provide an example to support your explanation.	IV	CO3
3D - 7	Discuss the role of procedural control in reasoning. How do facts and rules contribute to structured reasoning in AI?	II	CO3
3D - 8	What is the significance of rule formation and search strategy in knowledge-based systems?	I	CO4
3D - 9	Explain how specifying goal order influences the performance of reasoning algorithms. What strategies can be used for goal ordering?	II	CO4
3D - 10	What is negation as failure? Provide an example to illustrate its use in logic programming.	V	CO4
3D - 11	Explain the role of algorithm design in procedural control of reasoning.	II	CO4
3D - 12	Discuss the importance of committing to proof methods in logic programming.	III	CO4
3D - 13	What are the challenges of controlling backtracking in logic programming? How can backtracking be optimized?	II	CO4
3D - 14	Describe the concept of dynamic databases in logic programming.	IV	CO4
3D - 15	How does negation as failure contribute to non-monotonic reasoning? Discuss its limitations and potential alternatives.	V	CO4

UNIT – IV

OBJECTIVE QUESTIONS

SL.NO		BT Level	Course Outcome
4C - 1	What is the primary function of a production system? a) Data storage b) Problem-solving c) User interface design d) Encryption	I	CO5
4C - 2	Which of the following components is not part of a production system? a) Working Memory b) Production Rules c) Logical Gates d) Control System	II	CO5
4C - 3	What does the working memory in a production system store? a) User input b) Current state of the system c) Permanent rules d) Database schemas	I	CO5
4C - 4	Production rules in a production system are typically written in the form of: a) If-then statements b) For loops c) Mathematical equations d) Logical operators	I	CO5
4C - 5	What is the purpose of conflict resolution in production systems? a) To merge conflicting data b) To prioritize rules when multiple conditions are satisfied c) To debug errors in rules d) To maintain system logs	I	CO5
4C - 6	Which of the following is a common strategy for conflict resolution? a) Least recently used b) Random selection c) Specificity ordering d) First-in, first-out	II	CO5
4C - 7	Production systems are widely used in which field?	III	CO5

	a) Expert systems b) Graphics design c) Network routing d) File compression		
4C - 8	One of the main advantages of production systems is: a) Scalability b) Transparency and interpretability of reasoning c) Low storage requirements d) Reduced computational power	I	CO5
4C - 9	In the context of object-oriented representation, what does a frame typically represent? a) A specific rule b) A structured representation of an object or concept c) A memory storage unit d) A communication channel	I	CO5
4C - 10	Which of the following is a basic component of a frame? a) Production rules b) Slots and fillers c) Logical gates d) Encryption keys	I	CO5
4C - 11	Frames are most commonly used in: a) Numerical computations b) Data structuring and reasoning c) Game development d) Image processing	I	CO5
4C - 12	What is one way frame formalism can be extended? a) By adding dynamic methods to slots b) By reducing the number of slots c) By removing inheritance d) By using only predefined templates	I	CO5
4C - 13	Object-driven programming with frames combines: a) Frames and procedural code b) Frames and mathematical equations c) Frames and hardware specifications d) Frames and logical operators	I	CO5
4C - 14	Which of the following is a common method to make production systems more efficient? a) Increasing rule redundancy b) Optimizing pattern-matching algorithms c) Randomly removing rules d) Disabling working memory updates	II	CO5
4C - 15	In a frame-based system for planning a trip, which of the following could be a valid slot in a "Trip" frame? a) Destination b) Encryption key c) Compiler version d) Buffer size	III	CO5
FILL IN THE BLANKS			
4F - 1	The three primary components of a production system are the _____, _____, and _____.	II	CO5
4F - 2	_____ memory stores the current state or context in a production system.	I	CO5
4F - 3	Production rules are written in the form of _____ statements.	I	CO5
4F - 4	In conflict resolution, _____ ordering prioritizes rules that are more specific	I	CO5
4F - 5	One advantage of production systems is _____ and interpretability of reasoning	IV	CO5
4F - 6	In frame formalism, _____ are used to represent the attributes of an object.	I	CO5
4F - 7	A _____ in a frame system represents a specific value or data point for a slot.	I	CO5
4F - 8	Frame systems can be extended by adding _____ to handle dynamic	I	CO5

	behaviors.		
4F -9	Object-driven programming combines frames with _____ code for enhanced functionality.	I	CO5
4F - 10	In a trip-planning frame system, the slot _____ could store the date of departure.	I	CO5
4F - 11	_____ is the process used to choose among multiple applicable production rules.	I	CO5
4F - 12	A production system is considered efficient when its _____ and _____ processes are optimized.	I	CO5
4F - 13	Frames are commonly used in _____ representation to structure knowledge.	I	CO5
4F - 14	In a frame system, _____ inheritance allows objects to inherit properties from more general classes.	I	CO5
4F- 15	A slot in a frame can contain a specific value, a _____, or a default value.	II	CO5
MATCH THE FOLLOWING			
4M - 1	A)Working Memory B) Production Rules C) Conflict Resolution D)Slots in Frames	a) Attributes of objects b) Prioritizing conflicting rules c) Current state of the system d) If-Then rules	I CO5
4M - 2	A)Specificity Ordering B)Frame Formalism C) Methods in Frames D)Object-Driven Programming	a) Knowledge representation structure b) Resolving conflicts based on detail level c) Combines frames with procedural code d) Dynamic slot behaviors	I CO5
4M - 3	A)Production Systems B)Frame Slots C)Fillers in Frames D)Pattern Matching	a)Values or data for slots b)Identifies rules that match the current state c)Extending frame functionality d)Attributes or properties of an object	I CO5
4M - 4	A)Hierarchical Inheritance B) Slot C) Frame D) Inference Engine	a) Structure for stereotypical knowledge b) Inherit properties from a parent frame c) Executes rules based on conditions d) Attribute or property in a frame	I CO5
5 – MARKS QUESTIONS			
4D -1	What are production rules? Briefly explain their structure and purpose.	I	CO5
4D - 2	Define conflict resolution in the context of production systems. Why is it important?	II	CO5
4D - 3	Briefly explain working memory in the context of a production system.	II	CO5
4D - 4	What are production rules? Give an example to illustrate.	I	CO5
4D - 5	Evaluate the applications and advantages of using production systems in artificial intelligence.	V	CO5
4D - 6	What is a frame in knowledge representation? List its main components.	I	CO5
4D - 7	Using an example, demonstrate how frames can be used to plan a trip. Describe how slots and fillers are used in this context.	III	CO5
4D - 8	Differentiate between procedural and declarative knowledge in the context of frame systems.	IV	CO5
4D - 9	Briefly describe object-driven programming and its relation to frames.	II	CO5
4D - 10	Explain how inheritance works in frame-based systems with a simple example.	II	CO5
4D - 11	What is the purpose of using default values in frames?	I	CO5
4D - 12	Differentiate between slots and fillers in a frame-based system.	IV	CO5
4D - 13	Illustrate with an example how production rules can be used to solve a problem. Break down the steps of rule selection, application, and result generation.	V	CO5
4D - 14	Compare frames and objects in terms of knowledge representation.	IV	CO5
4D - 15	Explain the significance of inheritance and default values in frame-based systems. How do these features contribute to efficient knowledge representation?	II	CO5
UNIT – V			
OBJECTIVE QUESTIONS			
SL.NO		BT Level	Course Outcome

5C - 1	Which of the following represents a relationship between concepts in a structured description? A) Constant B) Role C) Concept D) Interpretation	I	CO6
5C - 2	In description logic, what does a 'concept' typically represent? A) A specific object B) A fixed value C) A group or category D) A function	I	CO6
5C - 3	Which process involves simplifying a knowledge base while preserving its meaning? A) Propagation B) Normalization C) Classification D) Satisfaction	I	CO6
5C - 4	What is 'entailment' in the context of knowledge representation? A) The structure of a class hierarchy B) A method to name objects C) Logical consequence of existing knowledge D) Assigning values to slots	I	CO6
5C - 5	Which component gives meaning to the symbols used in a description language? A) Role B) Interpretation C) Constant D) Entailment	III	CO6
5C - 6	What is the main goal of classification in taxonomies? A) To replace complex rules B) To check if data is valid C) To place concepts correctly within a hierarchy D) To apply inheritance	I	CO6
5C - 7	Which of the following terms refers to a fixed value used in structured descriptions? A) Role B) Interpretation C) Concept D) Constant	I	CO6
5C - 8	The correctness of subsumption computation ensures that: A) Only constants are used B) Classifications are reversible C) Results are logically valid D) All concepts are ignored	I	CO6
5C - 9	Structure matching is mainly used to: A) Combine constants B) Compare concept descriptions C) Interpret natural language D) Match truth values	I	CO6
5C - 10	Which of the following helps to propagate properties down a hierarchy? A) Normalization B) Subsumption C) Entailment D) Inheritance	I	CO6
5C - 11	Which term refers to the process of checking whether a knowledge base logically satisfies a given concept or statement? A) Normalization B) Satisfaction C) Classification D) Matching	I	CO6

5C - 12	In a frame-based or taxonomy-based system, what is typically passed from a superclass to its subclasses? A) Constants B) Concepts C) Roles D) Properties or values	I	CO6
5C - 13	A taxonomy of atomic concepts is primarily used for: A) Rule generation B) Syntax checking C) Hierarchical organization D) Natural language processing	I	CO6
5C - 14	What does structure matching in description logic compare? A) Constants with roles B) Natural language sentences C) Roles with interpretations D) Concept descriptions	I	CO6
5C - 15	Which of the following best describes subsumption? A) Assigning constants to variables B) Checking if one concept is more general than another C) Matching slots and fillers D) Replacing interpretations	V	CO6
FILL IN THE BLANKS			
5F - 1	A _____ phrase often represents a structured description of a concept in natural language.	I	CO6
5F - 2	In description logic, _____ are used to denote abstract groups or categories.	III	CO6
5F - 3	_____ define the relationships between different concepts in structured descriptions.	I	CO6
5F - 4	_____ are fixed values or specific instances within a knowledge base.	I	CO6
5F - 5	The _____ of a knowledge base gives meaning to the symbols used in it.	I	CO6
5F - 6	A statement is said to be _____ in an interpretation if it is true under that interpretation.	I	CO6
5F - 7	_____ occurs when one statement logically follows from another based on the knowledge base.	I	CO6
5F - 8	_____ is a process of simplifying the knowledge base without changing its logical meaning.	I	CO6
5F -9	In taxonomy, _____ is used to determine where a new concept fits within a hierarchy.	I	CO6
5F -10	_____ allows attributes or values to be passed down through a class or concept hierarchy.	III	CO6
5F -11	___ is the process of checking whether a concept logically follows from a given set of descriptions	I	CO6
5F -12	In structured descriptions, matching roles and concepts is known as _____ matching.	III	CO6
5F -13	The _____ algorithm checks if one concept is more general than another.	I	CO6
5F -14	A _____ organizes atomic concepts into a hierarchy based on subsumption relationships.	I	CO6
5F -15	_____ in description logic ensures that computed results are logically valid and consistent.	I	CO6
MATCH THE FOLLOWING			
5M - 1	A.Noun Phrase B. Concept C. Constant descriptions D. Role	a. Specific named individual or value b. Relationship between two concepts c. Represents structured natural language d. Abstract class or category	I CO6
5M - 2	A. Description Language meaning B. Interpretation C. Entailment D. Normalization	a. Simplifies descriptions without changing b.Logical consequence based on knowledge c. Assigns meaning to symbols in logic d. Formal way to express structured knowledge	I CO6

5M - 3	A. Structure Matching B.Subsumption C.Inheritance Propagation D.Computing Classification	a. Checks if one concept is more general than another b. Compares concept descriptions c. Putting things into categories d. Passing features from parent to child	I	CO6
5M - 4	A. Knowledge Base B. Computing Satisfaction facts C. Semantic Interpretation D. Reasoning System	a. Understanding the meaning of expressions b. System that draws conclusions from known facts c. Checking if all conditions or rules are met d. A collection of known facts and rules	I	CO6
5 – MARKS QUESTIONS				
5D -1	Explain the components of a structured description in description logic. Give an example using concepts, roles, and constants.		II	CO6
5D - 2	What is the role of interpretation in description logic? How does it help determine the truth of a statement?		I	CO6
5D - 3	Define entailment with reference to a knowledge base. How is it different from direct assertion?		II	CO6
5D - 4	What is normalization in the context of computing entailments? Why is it important before matching structures?		I	CO6
5D - 5	Compare and contrast taxonomies and frame hierarchies. How does inheritance work in each system?		IV	CO6
5D - 6	Describe the process of computing satisfaction in description logic. How is it used to validate knowledge bases?		II	CO6
5D - 7	What is structure matching in description logic? Explain how it helps in comparing complex concept descriptions.		I	CO6
5D - 8	Discuss the purpose and process of classification in taxonomies. How is it different from subsumption?		IV	CO6
5D - 9	What is subsumption in the context of concept hierarchies? Provide an example to illustrate your answer.		I	CO6
5D - 10	Explain the significance of computing entailments in AI systems. How does it contribute to intelligent reasoning?		II	CO6
5D - 11	Define constants, concepts, and roles in description logic. How do they work together to represent knowledge?		II	CO6
5D - 12	What is the difference between truth in an interpretation and logical entailment? Explain with suitable examples.		IV	CO6
5D - 13	How does inheritance function in taxonomy-based knowledge systems? Give an example to illustrate propagation.		II	CO6
5D - 14	Explain the process of computing classification in a description logic-based taxonomy. What challenges can arise?		II	CO6
5D - 15	Differentiate between taxonomy and a frame hierarchy. When would you use each in AI knowledge representation?		IV	CO6

