SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK

VI SEMESTER

1908602-COMPUTATIONAL INTELLIGENCE

Regulation – 2019

Academic Year 2024 – 2025 (Even Semester)

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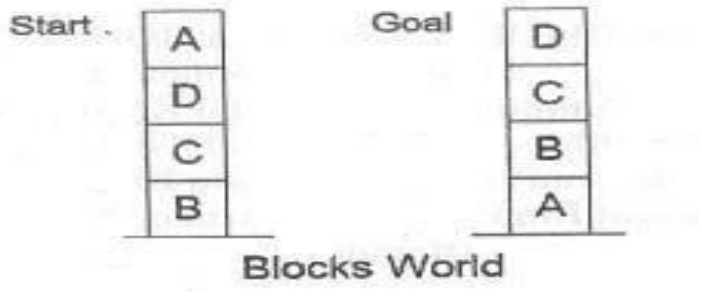
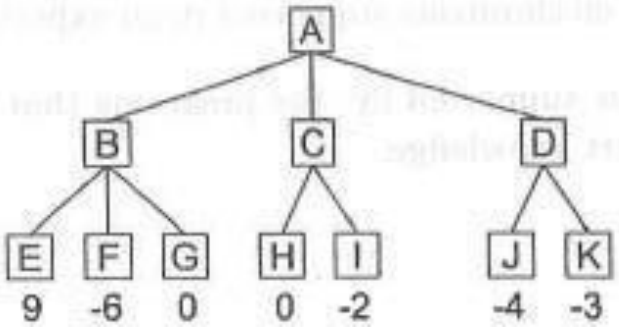
SUBJECT : 1908602 - Computational Intelligence
SEM / YEAR: VI Sem / III Year

UNIT I INTRODUCTION			
Introduction to Artificial Intelligence- Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system- Problem solving methods -Problem graphs, Matching, Indexing and Heuristic functions Search-A* algorithm-Game Playing- Alpha-Beta Pruning-Expert systems- Inference-Rules-Forward Chaining and Backward Chaining- Genetic Algorithms.			
PART – A			
Q.No	**Questions**	**BT Level**	**Competence**
1	Define Artificial Intelligence.	**BTL1**	**Remembering**
2	List the various types of searching available.	**BTL1**	**Remembering**
3	List the four categories under which AI is classified.	**BTL1**	**Remembering**
4	What are Expert Systems?	**BTL1**	**Remembering**
5	Outline the characteristic features of expert system.	**BTL1**	**Remembering**
6	Define Inference.	**BTL1**	**Remembering**
7	Name the components of a learning agent.	**BTL2**	**Understanding**
8	Define the effect of heuristic accuracy on performance.	**BTL2**	**Understanding**
9	Infer some of the uninformed search techniques.	**BTL2**	**Understanding**
10	Give the various classes of production system.	**BTL2**	**Understanding**
11	Write the general form of the genetic algorithm	**BTL1**	**Remembering**
12	What are the tasks of Artificial Intelligence?	**BTL1**	**Remembering**
13	What things we should do to build a system?	**BTL2**	**Understanding**
14	Define rational agent?	**BTL1**	**Remembering**
15	List down the characteristics of intelligent agent.	**BTL1**	**Remembering**
16	What are the factors that a rational agent should depend on at any given time?	**BTL2**	**Understanding**
17	Show the meaning of heuristic function and advantage.	**BTL2**	**Understanding**
18	Compare Informed & Uninformed search with examples.	**BTL2**	**Understanding**
19	What is a heuristic function?	**BTL1**	**Remembering**
20	State the Point of view of alpha-beta pruning.	**BTL1**	**Remembering**
21	Appraise when hill climbing fails to find a solution?	**BTL2**	**Understanding**
22	Assess the forward chaining rules with example.	**BTL2**	**Understanding**
23	List out the Properties of Forward-Chaining	**BTL2**	**Understanding**
24	What do you understand by a genetic algorithm.	**BTL2**	**Understanding**
PART – B			
1	How would you analyze informed search strategies and illustrate them with an example? (13)	**BTL4**	**Analyzing**
2	List the advantages and limitations of Genetic Algorithm. State the taxonomy of the crossover operator. (13)	**BTL3**	**Applying**

3	Define A* search algorithm. Discuss about the admissibility of A* algorithm. (13)	**BTL3**	**Applying**

4	Explain the various problem solving methods. (13)	**BTL4**	**Analyzing**
5	Discuss about the following: i) Greedy best-first search. (4M) ii) A* search .(4M) iii) Memory bounded heuristic search (5 M)	**BTL4**	**Analyzing**
6	Write short notes on (i)Inference rules (7) (ii) Expert systems (6)	**BTL3**	**Applying**
7	i. Give the characteristics of AI problems? Explain with example. (7) ii.Express what is Control Strategy and Production System? How this is helpful in AI. (6)	**BTL3**	**Applying**
8	(i) Illustrate the characteristics of production systems. (7) (ii) Differentiate between Uninformed and Informed Search Technique. (6)	**BTL3**	**Applying**
9	Why is Game Playing significant, and how can it be explained in detail? (13)	**BTL4**	**Analyzing**
10	i. Illustrate the role of knowledge engineer, domain expert and an end user in an expert system. (6) ii. Explain the difficulties involved in developing an expert system. (7)	**BTL3**	**Applying**
11	Point out the procedures of genetic algorithms and what are the different genetic representations. (13)	**BTL4**	**Analyzing**
12	What are the problems encountered during hill climbing and what are the ways available to deal with these problems? (13)	**BTL4**	**Analyzing**
13	Evaluate the efficiency of forward chaining in scenarios with large state spaces. (13)	**BTL4**	**Analyzing**
14	Explain how the steepest accent hill climbing works and Heuristic Functions? (13)	**BTL3**	**Applying**
15	(i) What is alpha-beta pruning, and how does it work? (3) (ii) Explain alpha beta pruning search technique / algorithm with an example.(10)	**BTL4**	**Analyzing**
16	How would you analyze and explain the functioning of a learning agent in detail?	**BTL4**	**Analyzing**
17	Consider the block world problem with four blocks A,B,C,D with the start and goal states given below,  Blocks World Assume the following two operations: Pick and a block and put it on table, pick up a block and put it on another block. Solve the above problem using Hill Climbing algorithm and a suitable heuristic function. Show the intermediate decisions and states. (13)	**BTL4**	**Analyzing**

PART – C			
1	Explain the basic principles of genetic algorithms. How do genetic algorithms mimic natural selection and evolution to solve problems? (15)	**BTL5**	**Evaluating**
2	Solve the given problem. Describe the operators involved in it. Consider a Water jug Problem: You are given two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a pump that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug? Explicit Assumptions: A jug can be filled from the pump, water can be poured out of a jug onto the ground, water can be poured from one jug to another and that there are no other measuring devices available. (15)	**BTL6**	**Creating**
3	Consider a two player game in which the minimax search procedure is used to compute the best moves for the first player. Assume a static evaluation function that returns values ranging from -10 to 10, with 10 indicating a win for the first player and -10 a win for the second player. Assume the following game tree in which the static scores are from the first player's point of view. Suppose the first player is the maximizing player and needs to make the next move. What move should be chosen at this point? Can the search be optimized? (15) 	**BTL6**	**Creating**
4	Assess the following types of hill climbing search techniques i) Simple hill climbing(5) ii) Steepest- Ascent Hill climbing(5) iii) Simulated Annealing(5)	**BTL4**	**Analyzing**
5	Evaluate the concept of alpha-beta pruning in game playing and justify how it enhances the efficiency of game-playing algorithms. (15)	**BTL5**	**Evaluating**

UNIT II KNOWLEDGE REPRESENTATION AND REASONING			
Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining -Backward Chaining - Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information - Prolog Programming			
PART – A			
Q.No.	**Questions**	**BT Level**	**Competence**
1	What are the standard quantifiers of First Order Logic?	**BTL1**	**Remembering**
2	Define unification.	**BTL1**	**Remembering**
3	Define Ontology.	**BTL1**	**Remembering**
4	List the predicates of time intervals.	**BTL1**	**Remembering**
5	What is independent axiom?	**BTL1**	**Remembering**
6	State the aspects of a knowledge representation language.	**BTL2**	**Understanding**
7	Give the expansion of LISP and PROLOG.	**BTL2**	**Understanding**
8	Infer FOL with an example.	**BTL2**	**Understanding**
9	State in your own words about uniqueness quantifier.	**BTL2**	**Understanding**
10	What is the significance in using the unification algorithm?	**BTL2**	**Understanding**
11	Differentiate prepositional logic and predicate logic.	**BTL2**	**Understanding**
12	Differentiate declarative and procedural knowledge.	**BTL2**	**Understanding**
13	Define Modus Ponen's rule in Propositional logic.	**BTL1**	**Remembering**
14	Analyze the definition of logic.	**BTL2**	**Understanding**
15	Define Forward Chaining	**BTL1**	**Remembering**
16	Define Backward Chaining.	**BTL1**	**Remembering**
17	Define Prolog programs.	**BTL1**	**Remembering**
18	Give the Applications of Prolog.	**BTL2**	**Understanding**
19	Analyze the time and event calculus.	**BTL2**	**Understanding**
20	Analyze the following in a predicate logic: For all x and y, if x is a parent of y then y is a child of x.	**BTL2**	**Understanding**
21	Identify the relationship between agents and mental objects.	**BTL1**	**Remembering**
22	Assess the chances for representing categories in first-order logic.	**BTL2**	**Understanding**
23	For the given sentence "All Pompeian‟s were Romans" write a well formed formula in predicate logic.	**BTL2**	**Understanding**
24	Compare predicate and propositional logic.	**BTL2**	**Understanding**
PART – B			
1	Describe briefly about Ontological Engineering. (13)	**BTL3**	**Applying**
2	Give the Syntax and Semantics of a first order logic in detail with an example. (13)	**BTL3**	**Applying**
3	Explain unification algorithm used for reasoning under predicate logic with an example. (13)	**BTL4**	**Analyzing**
4	Label how to convert English to prolog facts using facts and rules. (13)	**BTL3**	**Applying**
5	Classify the steps needed for Knowledge engineering Process in Predicate logic. (13)	**BTL3**	**Applying**
6	Illustrate how to create more general and flexible representations in Ontological engineering. (13)	**BTL4**	**Analyzing**
7	How would you examine and describe the ontology for situation calculus?(13)	**BTL4**	**Analyzing**

8	Differentiate propositional logic with FOL .List the inference rules along with suitable examples for first order logic. Write the algorithm for deciding entailment in propositional logic. (13)	**BTL4**	**Analyzing**
9	i) What is resolution Principle in propositional logic, explain? (7) ii) Let the following set of axioms is given to be true: P , $(P \wedge Q) \rightarrow R$, $(S \vee T) \rightarrow Q$, T . Assumption is that all are true. To Prove that R is true. (6)	**BTL3**	**Applying**
10	Explain Backward Chaining, with example in logic representation. Also mention advantages and disadvantages of both the algorithms. (13)	**BTL3**	**Applying**
11	Explain briefly about the characteristics of a prolog programming. (13)	**BTL4**	**Analyzing**
12	How is resolution in first order predicate logic different from that of propositional performed? What is Unification Algorithm & why it is required? (13)	**BTL4**	**Analyzing**
13	Trace the operations of the unification algorithm on each of the following pairs of literals: i) f(Marcus) and f(Caesar) (3) ii) f(x) and f(g(y)) (5) iii) f(Marcus, g(x,y)) and f(x, g(Caesar, Marcus)) (5)	**BTL4**	**Analyzing**
14	Calculate the completeness proof of resolution. (13)	**BTL3**	**Applying**
15	Describe briefly about Prolog Programming. (13)	**BTL3**	**Applying**
16	Illustrate the use of first order logic to represent knowledge (13)	**BTL4**	**Analyzing**
17	Describe briefly about forward Chaining (13)	**BTL3**	**Applying**
	PART – C		
1	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(7) ii) Convert the formulas of part a into clause form.(8)	**BTL4**	**Analyzing**
2	Evaluate the unification algorithm used for reasoning under predicate logic with an example. Consider the following facts. (15) a. Team India b. Team Australia c. Final match between India and Australia d. India scored 350 runs, Australia scored 350 runs, India lost 5 wickets, and Australia lost 7 wickets. e. The team which scored the maximum runs wins. f. If the scores are same the team which lost minimum wickets wins the match. Represent the facts in predicate, convert to clause form and prove by resolution "India wins the match".	**BTL4**	**Analyzing**
3	Explain resolution in predicate logic with suitable example. (15)	**BTL3**	**Applying**

4	Convert the following sentences to wff in first order predicate logic. (i) No coat is water proof unless it has been specially treated. (3) (ii) A drunker is enemy of himself. (3) (iii) Any teacher is better than a lawyer. (3) (iv) If x and y are both greater than zero, so is the product of x and y. (3) (v) Everyone in the purchasing department over 30 years is married. (3)	**BTL4**	**Analyzing**
5	Develop the following well-formed clause form with sequence of steps. ∀x:[Roman(x) ∧ know(x,Marcus)] ->[hate(x,Caesar)∨(∀y:∃:hate(y,z)] ->thinkcrazy(x,y))] (15)	**BTL4**	**Analyzing**

UNIT III FUZZY LOGIC

Non monotonic reasoning-Fuzzy Logic-Fuzzy rules-fuzzy inference-Temporal Logic-Temporal Reasoning-Neural Networks-Neuro-fuzzy Inference

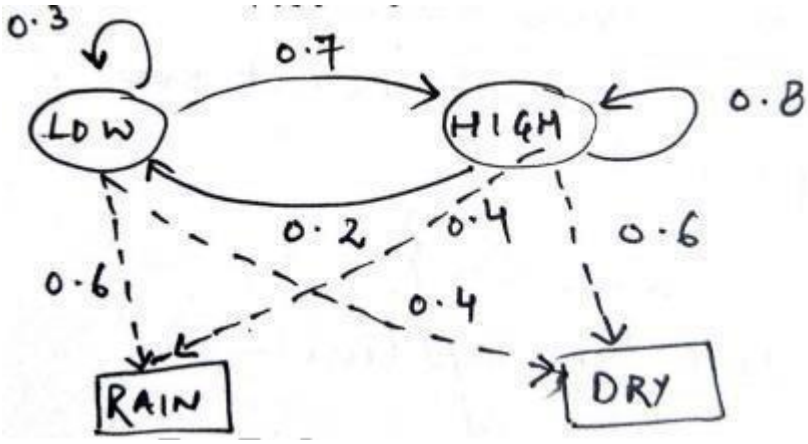
PART – A

Q.No.	Questions	BT Level	Competence
1	Define Neural Networks	**BTL1**	**Remembering**
2	What is Fuzzy Logic? What is its use?	**BTL1**	**Remembering**
3	Define non monotonic reasoning.	**BTL1**	**Remembering**
4	List the Application of neural networks	**BTL1**	**Remembering**
5	What are the ways in which one can understand the semantics of a belief network?	**BTL1**	**Remembering**
6	What are the two functions in Neural network‟s Activation functions?	**BTL1**	**Remembering**
7	What is the need for probability theory in uncertainty?	**BTL1**	**Remembering**
8	Give some example of non-monotonic reasoning.	**BTL2**	**Understanding**
9	What are the disadvantages of closed world Assumption? How will you overcome it?	**BTL2**	**Understanding**
10	Express fuzzy inference.	**BTL2**	**Understanding**
11	What are the structures of neural network?	**BTL2**	**Understanding**
12	Write the properties of fuzzy sets.	**BTL2**	**Understanding**
13	Define Fuzzification Module	**BTL1**	**Remembering**
14	What is Propositional fuzzy logics	**BTL1**	**Remembering**
15	Define Inference Engine	**BTL1**	**Remembering**
16	List out the Applications of Neural Networks	**BTL1**	**Remembering**
17	Produce the main difficulties involved with the gradient descent method.	**BTL2**	**Understanding**
18	Analyze the different types of FLC.	**BTL2**	**Understanding**
19	Point out the degree of membership.	**BTL2**	**Understanding**
20	Differentiate fuzzification and defuzzification.	**BTL2**	**Understanding**
21	What happens if the examples are not linearly separable?	**BTL2**	**Understanding**
22	Criticize the remarks on back propagation.	**BTL2**	**Understanding**
23	Tell how do you think about non-monotonic reasoning is in terms of arguments.	**BTL2**	**Understanding**

24	In a class of 10 students (the universal set), 3 students speaks German to some degree, namely Alice to degree 0.7, Bob to degree 1.0, Cathrine to degree 0.4. What is the size of the subset A of German speaking students in the class?	**BTL2**	**Understanding**
PART – B			
1	Define Fuzzy Set? Explain in brief about Fuzzy set operations?(13)	**BTL3**	**Applying**
2	Identify the different key issues with respect to non-monotonic reasoning system? (13)	**BTL4**	**Analyzing**
3	What is the entire temporal model? Explain filtering and prediction in temporal model. (13)	**BTL3**	**Applying**
4	Identify the list of basic structure of a generic temporal models. (13)	**BTL3**	**Applying**
5	Classify the fuzzy rules with examples. (13)	**BTL4**	**Analyzing**
6	Demonstrate fuzzy inferences from imprecise data. (13)	**BTL3**	**Applying**
7	Interrelate the factors influencing back propagation neural network. (13)	**BTL4**	**Analyzing**
8	Write a note on fuzzy logic. How do it uses for probabilistic Reasoning (13)	**BTL3**	**Applying**
9	Distinguish between single layer and multi-layer perception neural networks? (13)	**BTL3**	**Applying**
10	How it is useful for decision making under uncertainty? Explain belief networks briefly. (13)	**BTL3**	**Applying**
11	Explain in brief about fuzzy propositions? (13)	**BTL4**	**Analyzing**
12	Point out the type of problems that can be solved with neural network? What are the advantages? What are the inconvenient.(13)	**BTL4**	**Analyzing**
13	Demonstrate the concept of non-monotonic reasoning with examples. (13)	**BTL3**	**Applying**
14	Explain in brief about Temporal logic? (13)	**BTL4**	**Analyzing**
15	Discuss the structure, function, and applications of Neural Networks in detail. (13)	**BTL4**	**Analyzing**
16	Assess the Temporal Logic with Reasoning. (13)	**BTL3**	**Applying**
17	Write the most popular algorithm for training a neural network? What is its principle? (13)	**BTL3**	**Applying**
PART – C			
1	Analyze the certainty and uncertainty factors. (15)	**BTL4**	**Analyzing**
2	With the help of diagram, explain the training algorithm of Back Propagation networks and discuss how the various parameters are chosen for training the neural net? (15)	**BTL4**	**Analyzing**
3	Explain the neuro fuzzy architecture and give some applications. (15)	**BTL4**	**Analyzing**
4	Explain fuzzy logic control with the neat diagram. (15)	**BTL3**	**Applying**
5	Explain the neuro fuzzy architecture and outline the applications. (15)	**BTL3**	**Applying**

UNIT IV LEARNING			
Probability basics - Bayes Rule and its Applications - Bayesian Networks – Exact and Approximate Inference in Bayesian Networks - Hidden Markov Models - Forms of Learning - Supervised Learning - Learning Decision Trees – Regression and Classification with Linear Models - Artificial Neural Networks – Nonparametric Models - Support Vector Machines - Statistical Learning -Learning with Complete Data - Learning with Hidden Variables- The EM Algorithm – Reinforcement Learning			
PART – A			
Q.No.	**Questions**	**BT Level**	**Competence**
1	Define Bayes theorem	**BTL1**	**Remembering**
2	What is localization problem?	**BTL1**	**Remembering**
3	Define Artificial Neuron model.	**BTL1**	**Remembering**
4	Mention the statistical learning methods.	**BTL1**	**Remembering**
5	What is HMM?	**BTL1**	**Remembering**
6	Define EM algorithm.	**BTL1**	**Remembering**
7	State in your own words about conditional probability.	**BTL2**	**Understanding**
8	Infer what is Reward Function in Reinforcement learning?	**BTL2**	**Understanding**
9	Give the different forms of learning.	**BTL2**	**Understanding**
10	State the support vector in SVM?	**BTL2**	**Understanding**
11	Generalize the categories of neural network structures?	**BTL1**	**Remembering**
12	Distinguish between full joint probability distribution and joint probability distribution.	**BTL2**	**Understanding**
13	Give the Bayes' rule equation.	**BTL1**	**Remembering**
14	What is meant by learning?	**BTL1**	**Remembering**
15	List some of the practical uses of decision tree learning	**BTL1**	**Remembering**
16	Differentiate between Passive learner and Active learner	**BTL2**	**Understanding**
17	Organize the key features of reinforcement learning.	**BTL2**	**Understanding**
18	Organize the types of learning.	**BTL2**	**Understanding**
19	Difference between Classification and Regression.	**BTL2**	**Understanding**
20	Identify the issues that affect the design of a learning element.	**BTL1**	**Remembering**
21	Assess Bayesian networks with an example.	**BTL2**	**Understanding**
22	Write some applications of Supervised Learning.	**BTL2**	**Understanding**
23	Given that P (A) =0.3, P (A |B) =0.4 and P (B) =0.5, compute P (B|A).	**BTL2**	**Understanding**
24	Draw the state transition diagram for Markov system.	**BTL2**	**Understanding**
PART – B			
1	Illustrate the concept of Hidden Markov Model and its applications in AI. (13)	**BTL3**	**Applying**
2	Define EM algorithm and explain the general form of EM algorithm. (13)	**BTL3**	**Applying**
3	Describe briefly about the Regression and Classification with Linear Models. (13)	**BTL3**	**Applying**
4	Identify Various Types of Reinforcement Learning Techniques. (13)	**BTL3**	**Applying**
5	Distinguish between Supervised Learning and Unsupervised Learning. Also mention some of the application areas of both. (13)	**BTL4**	**Analyzing**
6	Express the statistical Learning with examples. (13)	**BTL4**	**Analyzing**
7	Describe briefly about (i) Continuous model for Maximum likelihood Estimation (6) (ii) Learning with Hidden Variables. (7)	**BTL3**	**Applying**

<table>
<tr><td>8</td><td>Marie‟s marriage is tomorrow
In recent years , each year it has rained only 5 days.
The weatherman has predicted rain tomorrow.
When it actually rains the weatherman correctly forecasts rain 90% of the time.
When it doesn‟t rain, the weatherman incorrectly forecasts rain 10% of time.
What is the probability that it will rain on the day of Marie‟s wedding? (13)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>9</td><td>Generalize Support Vector Machines in detail. What are advantages and disadvantages of SVM? (13)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>10</td><td>Tell briefly about the Decision Tree Learning? Why it is useful in AI applications? (13)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>11</td><td>i. Explain ANN and Artificial neuron. (6)
ii. What is feed forward neural network. (7)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>12</td><td>What is learning with complete data? Explain Maximum Likelihood Parameter Learning with Discrete Model in detail. (13)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>13</td><td>Can linear regression be used for classification? Justify. (13)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>14</td><td>Explain variable elimination algorithm for answering queries on Bayesian networks. (13)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>15</td><td>Describe the Learning with macro operators. (13)</td><td>BTL3</td><td>Applying</td></tr>
<tr><td>16</td><td>How to handle uncertain knowledge with example .(13)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>17</td><td>Discuss the steps of the EM algorithm and analyze its functionality using an example. (13)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td colspan="4">PART – C</td></tr>
<tr><td>1</td><td>Construct the Bayseian network and define the necessary CPTs for the given scenario we have a bag of three biased coins a, b and c with probabilities of coming up heads of 20%, 60%and 80% respectively. One coin is drawn randomly from the bag (with equal likelihood of drawing each of the three coins) and then the coin is flipped three times to generate the outcomes X1, X2 and X3. (15)</td><td>BTL4</td><td>Analyzing</td></tr>
<tr><td>2</td><td>The following table consists of training data from an employee database. The data have been generalized. Let status be the class label attribute. Construct Decision tree from the given data. (15)
<table>
<tr><th>Department</th><th>Age</th><th>Salary</th><th>Count</th><th>Status</th></tr>
<tr><td>Sales</td><td>31…35</td><td>46k..50k</td><td>30</td><td>Senior</td></tr>
<tr><td>Sales</td><td>26…30</td><td>26k..30k</td><td>40</td><td>Junior</td></tr>
<tr><td>Sales</td><td>31…35</td><td>31k..35k</td><td>40</td><td>Junior</td></tr>
<tr><td>Systems</td><td>21…25</td><td>46k..50k</td><td>20</td><td>Junior</td></tr>
<tr><td>Systems</td><td>31…35</td><td>66k..70k</td><td>5</td><td>Senior</td></tr>
<tr><td>Systems</td><td>26…30</td><td>46k..50k</td><td>3</td><td>Junior</td></tr>
<tr><td>Systems</td><td>41…35</td><td>66k..70k</td><td>3</td><td>Senior</td></tr>
<tr><td>Marketing</td><td>36…40</td><td>46k..50k</td><td>10</td><td>Senior</td></tr>
<tr><td>Marketing</td><td>31…35</td><td>41k..45k</td><td>4</td><td>Junior</td></tr>
<tr><td>Secretary</td><td>46…50</td><td>36k..40k</td><td>4</td><td>Senior</td></tr>
<tr><td>Secretary</td><td>26…30</td><td>26k..30k</td><td>6</td><td>Junior</td></tr>
</table></td><td>BTL4</td><td>Analyzing</td></tr>
</table>

3	Consider the following data provided for Weather Forecasting Scenario. Two states (Hidden): 'Low' and 'High' atmospheric pressure. Two observations (Visible States): 'Rain' and 'Dry'. Calculate a probability of a sequence of observations.  	**BTL6**	**Creating**
4	Explain Reinforcement learning technique in detail .Also Mention its applications in the field of Artificial intelligence. (15)	**BTL4**	**Analyzing**
5	What is the maximum number of edges in a Bayesian network (BN) with n nodes? Prove that a valid BN containing this number of edges can be constructed (remember that the structure of a BN has to be a Directed Acyclic Graph).(15)	**BTL4**	**Analyzing**

UNIT V INTELLIGENCE AND APPLICATIONS			
Natural language processing-Morphological Analysis-Syntax analysis-Semantic Analysis-AIl applications – Language Models - Information Retrieval – Information Extraction – Machine Translation – Machine Learning - Symbol-Based – Machine Learning: Connectionist – Machine Learning			
PART – A			
Q.No.	**Questions**	**BT Level**	**Competence**
1	Define CFG.	**BTL1**	**Remembering**
2	Define NLP.	**BTL1**	**Remembering**
3	State Morphology.	**BTL1**	**Remembering**
4	Label the terminologies are available in NLP?	**BTL1**	**Remembering**
5	What is nouns and give example for nouns.	**BTL1**	**Remembering**
6	List out the advantages of NLP.	**BTL1**	**Remembering**
7	Give the merits and demerits of context free grammars.	**BTL2**	**Understanding**
8	Identify the components of Natural language processing.	**BTL2**	**Understanding**
9	Infer parse tree and give example.	**BTL2**	**Understanding**
10	Express adjectives with examples.	**BTL2**	**Understanding**
11	Sketch the basic definition of top down parse.	**BTL1**	**Remembering**
12	Show how would you differentiate Machine Translation and Learning?	**BTL2**	**Understanding**
13	Prepare how mapping works in NLP?	**BTL2**	**Understanding**
14	Analyze why is NLP difficult?	**BTL2**	**Understanding**
15	Differentiate syntax and semantic analysis in NLP terminologies.	**BTL2**	**Understanding**
16	Point out the advantages and disadvantages of top down parser.	**BTL1**	**Remembering**

17	What is Morphological Analysis?	**BTL1**	**Remembering**

18	List out the steps in NLP	**BTL1**	**Remembering**
19	What is a language model?	**BTL1**	**Remembering**
20	Define Expert Systems?	**BTL1**	**Remembering**
21	Appraise the name of application in NLP?	**BTL2**	**Understanding**
22	Assess information retrieval process in the applications of NLP.	**BTL2**	**Understanding**
23	Tell about language models in the applications of NLP.	**BTL1**	**Remembering**
24	Write about symbol based application in intelligence.	**BTL2**	**Understanding**
	PART – B		
1	List the Steps in Natural Language Processing and explain them with some examples. (13)	**BTL3**	**Applying**
2	Describe the categories involved in Information Retrieval system. (13)	**BTL3**	**Applying**
3	Describe the structure of NLU and its difficulties. (13)	**BTL3**	**Applying**
4	Describe about NLP? Write in details about various application of NLP. (13)	**BTL3**	**Applying**
5	Express the basic concept of Machine Translation System with a Schematic diagram. (13)	**BTL4**	**Analyzing**
6	Discuss the concept of Computer Intelligence and its application. (13)	**BTL3**	**Applying**
7	(i) Illustrate probabilistic models for information extraction. (7) (ii) Express conditional random fields for information extraction. (6)	**BTL4**	**Analyzing**
8	Explain briefly on implementation aspects of syntactic analysis. (13)	**BTL3**	**Applying**
9	Demonstrate the key components of Machine Learning and explain its processes. (13)	**BTL3**	**Applying**
10	Write short notes on i) Phonology (2) ii) Morphology (2) iii) Discourse (2) iv) Semantics (3) v) Syntax (4)	**BTL3**	**Applying**
11	Find the algorithm that is capable of learning to recognize the handwritten digits and squeezing every last drop of predictive performance out of them. (13)	**BTL3**	**Applying**
12	Compare the machine learning and machine translation application of NLP. (13)	**BTL4**	**Analyzing**
13	Evaluate whether an IR system is performing well? (13)	**BTL3**	**Applying**
14	Analyze any two machine learning algorithms with an example. (13)	**BTL4**	**Analyzing**
15	Identify about the application of natural language processing. (13)	**BTL4**	**Analyzing**
16	Illustrate the concepts of the PageRank algorithm and the HITS algorithm with their key differences. (13)	**BTL3**	**Applying**
17	Organize how phrase structure ambiguity affects NLP? Illustrate possible phrase structures for the sentence: "John saw the man on the mountain with a telescope". (13)	**BTL3**	**Applying**

PART – C

1	Point out the importance of syntax and semantics in NLP. Construct a grammar and draw the parse tree for the sentence "Bill Printed the file". (15)	**BTL4**	**Analyzing**
2	Case study: Find the algorithm that is capable of learning to recognize the handwritten digits and squeezing every last drop of predictive performance out of them. (15)	**BTL6**	**Creating**
3	What is Natural language processing? Mention its application domain in AI. What are some of the problems which arise in natural language understanding for autonomous machines like robots, intelligent computers? (15)	**BTL4**	**Analyzing**
4	Explain the structure and research models involved in machine translation. (15)	**BTL4**	**Analyzing**
5	Design an expert system for Travel recommendation and discuss its roles. (15)	**BTL4**	**Analyzing**

Staff In-charge(s) **HOD**