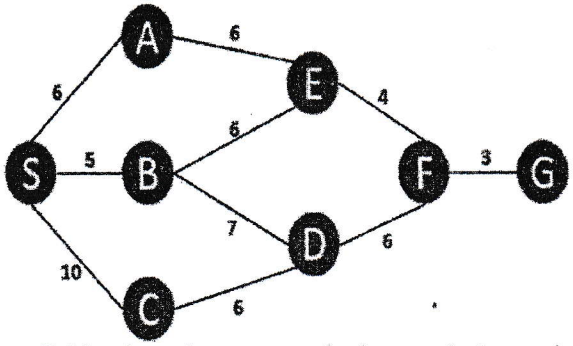
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2080 Chaitra

Exam.	**Regular**		
Level	BE	**Full Marks**	80
Programme	BCT	**Pass Marks**	32
Year / Part	III / II	**Time**	3 hrs.

Subject: - Artificial Intelligence (*CT 653*)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Can machine think? Explain your stance with appropriate reasons. Relate it with Turing Test and Reverse Turing Test. [2+4]
2. What do mean by Constraints Satisfaction Problem? List all the constraints and solve the following crypto-arithmetic problem: EAT + THAT = APPLE [2+5]
3. How A* search overcomes problem associated with Greedy Best First Search? Using following figure and table where starting node is S and destination is G, compare the result of A* algorithm with greedy search. [3+4+3]



From	Cost
S	15
A	10
B	12
C	5
D	4
E	2
F	1
G	0

(Note: Table gives the cost required to reach the goal and information in the connecting link represents cost from one node to the other.)

4. List down the steps for converting to CNF and proof by resolution refutation. Convert the following sentences into FOPL and answer "Did Curiosity kill the cat" by resolution refutation. [3+5]
   a) Everyone who loves all animals is loved by someone.
   b) Anyone who kills an animal is loved by no one.
   c) Jack loves all animals.
   d) Either Jack or Curiosity killed the cat.
5. Discuss about the different approaches knowledge representation. How do you make choice among these approaches? Is it possible to evaluate the knowledge representation? List down any issues associated with it. [2+2+2+2]
6. When shall we use Fuzzy Logic? Explain with appropriate example. What are the steps of major steps for developing system based on Fuzzy logic? [2+5]
7. What is Prior Probability and Posterior Probability and show how these probabilities are used in Bayes Theorem. Is there any connection between Belief Network and Bayes Theorem? Justify with an example. [3+5]
8. You are hired by a company to develop a Nepali Chatbot System. What are the knowledge bases that is required to develop the system? List down the different steps involved in the development of this Nepali Language based NLP tool with suitable block diagram and examples. [2+6]

9. You need to work as a Knowledge Engineer for a company in developing expert system for Disease Diagnosis. Draw a block diagram and highlight the major steps for development of this expert system. [6]

10. Write Short notes on: [3×4]

    a) Forward chaining and Backward chaining
    b) Hopfield Neural Network
    c) Machine Vision

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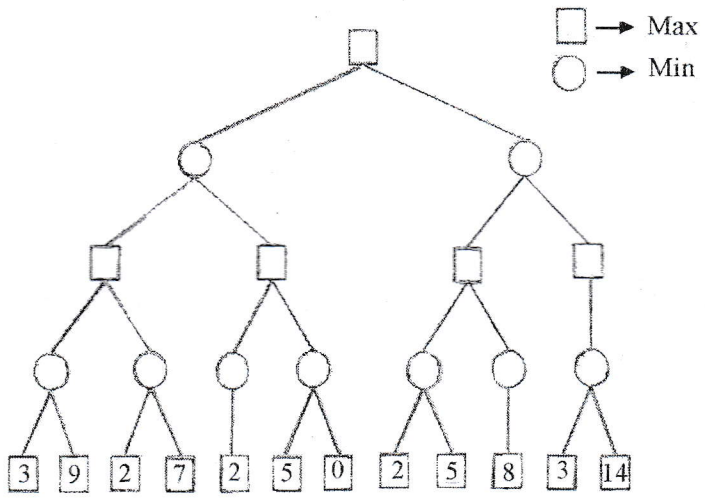
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2079 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence (*CT 653*)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define Artificial Intelligence (AI)? Differentiate between Natural (Human) Intelligence and Artificial Intelligence. Can AI replace Humans? Justify. [1+3+4]
2. What is Constrain Satisfaction problem? Solve the following problem LOGIC + LOGIC = PROLOG. [3+5]
3. What is minmax search? Apply minmax search along with alpha-beta pruning for the following tree at max node at top. [2+6]



4. What is semantic network? Convert the following sentences into semantic network.
   i) The avg height of an adult is 5'6".
   ii) Cricket player is an adult male.
   iii) Adult male is a person.
   iv) Batting average of a cricket player is 37.59
   v) Rohit Paudel is a Fielder.
   vi) Fielder is a cricket player.
   vii) Team of Rohit Paudel is Nepal. [2+6]
5. Why CNF is necessary? "Everyone who loves all animals are loved by someone" represent this statement in FOPL and explain all the steps involved to convert it into CNF. [2+6]
6. What is belief network? How reasoning is done in this network? [2+6]
7. What is evolutionary computing? List down the steps in genetic algorithm with an example. [2+6]
8. What is perceptron? When do we need back propagation algorithm? Explain with an example. [2+6]
9. What is expert system? Create a scenario where we require expert system. List down the steps how you create this system. [2+6]
10. When do we need Natural Language Processing? Explain different steps of NLP. [3+5]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2078 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT 653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What are intelligent agents and how can we design intelligent agent? Explain with examples on relevance to PEAS framework. [4+4]
2. What is well defined problem? Solve the following crypto-arithmetic problem by defining it. [2+6]

   TWO + TWO = FOUR
3. Why is searching important in problem solving? What are the drawbacks of greedy best – first search and how A* search technique is used to solve it. Explain with example. [2+7]
4. Define horn clause with example. Consider the following axioms:

   i) Every child love Santa.
   ii) Everyone who loves Santa loves any reindeer.
   iii) Rudolph is a reindeer, and Rudolph has a red nose.
   iv) Anything which has a red nose is weird or is a clown.
   v) No reindeer is a clown.
   vi) Scrooge does not love anything which is weird.

   Represent these axioms in a predicate calculus and then convert each formula to CNF.

   List down the rules of inference. When can we use these rules? Explain. [3+3]
5. Explain how statistical reasoning aids in inference and reasoning in light of Bayes theorem. At a certain University, 5% of men are over 6 feet tall and 2% of women are 6 feet tall. 60% of students are female. If a student is selected at a random from among all those over six feet tall, what is the probability that the selected students is woman? [3 +5]
6. Explain frame and Semantic Net with example. List down their advantages and disadvantages. [4+4]
7. List down the algorithms inspired by biological phenomena and social behaviors. Explain the learning process in Genetic Algorithm with suitable block diagram. [2+6]
8. Using Hebbian learning algorithm construct a neural network that behaves as an AND gate. Is hebbian learning supervised method? Justify. [6+3]
9. What are expert systems? Explain the architecture of expert system with suitable block diagram. Highlight the advantages and disadvantages of expert system. [1+4+3]
10. What is natural language understanding and natural language generation? Briefly list down the steps. Discuss the issues related with NLP. [2+4+2]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2077 Chaitra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT 653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define Artificial Intelligence (AI). When is a machine said to have passed the Turing Test? Discuss two fields of application of AI. [2+3+3]
2. What do you understand by Production system problem? Solve the following crypto arithmetic problem. [2+6]

   WRONG + WRONG = RIGHT
3. List out the disadvantages of MIN-MAX algorithm for Game playing and explain how Alpha-beta pruning helps to overcome the limitation of MIN-MAX algorithm with an example. [2+6]
4. It is a crime for an American to sell weapons to hostile nations. Nono has some missiles. All the missiles owned by Nono were sold to it by Colonel West. Missiles are weapons. An enemy of America counts as hostile. Colonel West is an American. The country Nono, is an enemy of America. Prove that Colonel West is a criminal by using FOPL based Resolution Refutation Method. [8]
5. What is rule-based reasoning? Explain with an example. How Bayes theorem wedin belief network? [2+6]
6. What do you mean by Conceptual Dependency? Explain how knowledge is represented using scripts. [3+5]
7. Explain all the steps in the genetic algorithm with block diagram and operators. [8]
8. What is neural network? Show that a single neuron cannot implement XOR gate. [2+6]
9. Draw the block diagram of an expert system and briefly explain each component. List the benefits of using expert system? [6+2]
10. Write short notes on: [2×4]
    a) Hill climbing problems
    b) Fuzzy learning

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Baisakh

Exam.	**Back**		
Level	BE	**Full Marks**	80
Programme	BCT	**Pass Marks**	32
Year / Part	III / II	**Time**	3 hrs.

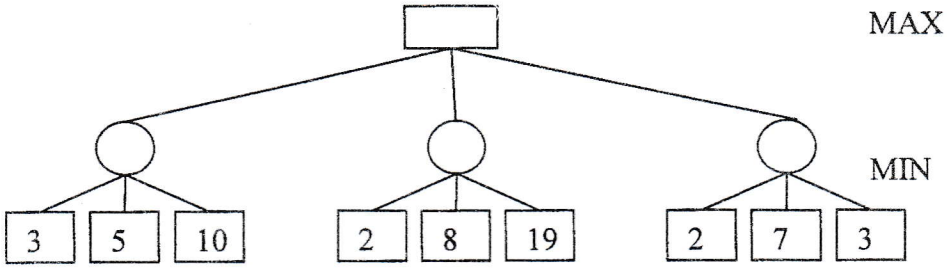
Subject: - Artificial Intelligence *(CT 653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define Artificial Intelligence. Justify that "system that think rationally and act rationally." is part of Artificial Intelligence. [8]
2. Solve following crypto-arithmetic problem.

   SEND+MORE=MONEY.

   Assign different decimal digit to different letters. Explain the steps followed for the solution. [8]
3. Discuss about alpha-beta purning algorithm. Find the value of min max value using this concept in the following tree. [4+4]



4. List down the rule for Inference. Consider the following axioms.
   All hounds howl at night.
   Anyone who has any cats will not have any mice.
   Light sleepers do not have anything which howls at night.
   John has either a cat or a hound.
   Prove: "If John is a light sleeper, then John does not have any mice." By using resolution refutation. [2+8]
5. Define a semantic network and frames with an example. List advantages and limitations of both. [6+2]
6. What is machine learning? Explain learning by analogy with example. [2+6]
7. What is McCulloch/Pitts neuron? Can this neuron be trained, to represent EX-OR gate? It Justify and propose neural network model. [10]
8. What is an expert system? Explain the components of an expert system. [1+7]
9. Write short notes on: [3x4]
   a) Boltzman Machine
   b) Conjuctive Normal Form
   c) A* Algorithm

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2076 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT 653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define Artificial Intelligence. Describes four views of Artificial Intelligence in details. [6]
2. What is well defined problem? You are given two jugs, a 5-gallon one and a 7-gallonone, a pump which has unlimited water which you can use to fill the jug, and the ground on which water may be poured. Neither jug has any measuring markings on it. How can you get exactly 4 gallons of water in the 1-gallon jug? Solve the problem using production system. [2+6]
3. Distinguish between Breadth First Search and Depth First Search. Write algorithm for Min Max algorithm with appropriate example of your own. [4+4]
4. Assume following facts: [3+5]
   a) Dinesh likes all kinds of food.
   b) Samôsa's are food.
   c) Cake is food.
   d) Anything anyone eats and isn't killed by is food.
   e) Suresh eats peanuts and still alive.
   f) Aashu eats everything suresh eats.
   First write all the clauses into predicates, then using resolution refutation method, prove that Dinesh likes peanuts.
5. In a village 1% of people have a certain genetic defect. 90% of test for gene defected people detect the defect. 9.6% of the test detect the positive result even if the person has no gene defect. If a person gets a positive test result, what are the odds they actually have the genetic defect? [4]
6. What are the issues in knowledge representation? Represent the following sentences into a semantic network: [2+4]

   Circus elephants are elephants
   Elephants have head.
   Elephants have trunks.
   Heads have mouths.
   Elephants are animals.
   Animals have hearts.
   Circus elephants are performers.
   Performers have costumes.
   Costumes are cloths.
   Horatio is a circus elephant.

7. What do you mean by label data? Use ID3 method for following data to draw decision tree diagram. [2+8]

AGE	COMPETITION	TYPE	PROFIT
OLD	YES	SOFTWARE	DOWN
OLD	NO	SOFTWARE	DOWN
OLD	NO	HARDWARE	DOWN
MID	YES	SOFTWARE	DOWN
MID	YES	HARDWARE	DOWN
MID	NO	HARDWARE	UP
MID	NO	SOFTWARE	UP
NEW	YES	SOFTWARE	UP
NEW	NO	HARDWARE	UP
NEW	N0	SOFTWARE	UP

8. Differentiate the followings: [5×2]
   a) Rule based learning versus Fuzzy learning
   b) Expert System versus Management Information System

9. Explain two practical example of Natural Language Processing in real life. Explain all the steps of Natural Language Processing in details. [3+5]

10. Write short notes on the followings: [4×3]
    a) Min-max search
    b) Skolemization
    c) Virtual reality

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35 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is an intelligent agent? How does learning agent work? [8]
2. What do you understand about well defined problems? Explain about problems that can be solved using production rules with an example. [2+6]
3. Discuss about the evaluation criteria for search algorithm. State the problems in hill climbing search algorithm. [4+4]
4. Why CNF is necessary? "Everyone who loves all animals are loved by someone" represent this statement in FOPL and explain all the steps involved to convert it into CFN. [2+6]
5. What is knowledge representation? How semantic network is used to represent knowledge? [2+6]
6. What do you understand by swarm intelligence? Suppose chromosomes are of the form x = a b c d e f g h with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as: [2+8]

   $f(x) = (a+b)-(c+d)+(e+f)-(g+h)$ and let the initial population consist of four individuals with the following chromosomes.
7. What is Natural Language Processing (NLP)? Discuss the different steps in NLP with suitable examples. Also list down major issues in NLP. [6+2+2]
8. Explain Hopfield network with an example. [8]
9. Write short notes on: [3×4]

   i) Predicate logic
   ii) Unsupervised learning
   iii) Breadth first vs depth first search

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2075 Baisakh

Exam.	Back		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define AI. What is the importance of Turning Test in AI? List applications of AI. [2+4+2]
2. What is problem space? Solve the following crypto arithmetic problem by showing all the steps. [2+6]

   BASE + BALL = GAMES
3. Discuss the hill climbing search algorithm along with problem associated with it and discuss their solutions. Why simulated annealing is important? [6+2]
4. Given premises "Every American who sells weapons to hostile nations is a criminal. The country XYZ is enemy of America. All of its misallies in XYZ were sold by Donald, who is an American." Prove that Donald is a criminal by using FOPL based resolution refutation method. [8]
5. Why CNF is required? Explain all the steps used to convert a quantified statement with suitable example. [2+6]
6. Why semantic network and frames are important in AI? Provide examples of both with FOPL statements example. [2+6]
7. What is a genetic algorithm? Explain all steps in genetic algorithm with block diagram and operators. [8]
8. List the importance of expert system in real life. Draw block diagram of expert system architecture and explain all blocks. [2+6]
9. What is a McCulloch/Pitts neural network? Explain it with reference to AND gate. Justify that it cannot be applied to Exclusive OR gate. [8]
10. Justify that NLP is one of the important part of an AI. Explain the steps involved in the NLP. [8]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2074 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is a rational agent? "System that think like humans" and "System that act like humans" are the part of artificial intelligence. Justify these statement with practical example. [1+6]
2. Define constraint satisfaction problem (CSP). Solve the following crypto-arithmetic problem, where different letters denote different integers and identical letters denote same integer. SWIM + WEAR = RELAX. [1+6]
3. Why Searching is important in problem solving? What do the drawbacks of greedy best-first search and how A* search algorithm solve it. Explain with an example. [2+7]
4. a) Assume the following facts: [8]
   - 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.

   Prove that John likes peanuts using resolution.

   b) Differentiate between forward and backward chaining. [4]
5. What is Frame? How is it different from semantic net in knowledge representation? [7]
6. Define inductive Learning. Explain in detail about ID3 process with suitable example. [2+6]
7. What is self-organizing Map (SOM)? Explain all the steps involved in SOM with suitable example. [2+5]
8. Justify that the study of gene is one of important part in the AI. List down the steps involved in genetic algorithm with an example. [4+4]
9. How knowledge acquisition is performed in expert system? Explain one real expert system example with proper architecture. [2+5]
10. Write short notes on: (Any two) [2×4]
    a) Machine Vision
    b) Supervised Vs Unsupervised learning
    c) Back Propagation Algorithm

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define Artificial Intelligence (AI). Describe the importance and practical application of AI. [6]
2. A farmer has a goat, a wolf and a cabbage on the west side of a river. He wants to get all of his animals and his cabbage across the river onto the east side. The farmer has a row boat but he only has enough room for himself and one other thing. The wolf will eat the goat if they are left together alone. The goat will eat the cabbage if they are left together alone. How can the farmer get everything on the east side? [8]

   i) Formulate this puzzle as search
   ii) Solve this problem-using search (any method)
   Draw the search tree and show the final solution
3. Devise an example to show how A* algorithm uses path cost and heuristic cost to generate best solution. [8]
4. Consider the following axioms: [10]

   i) Anyone whom Mary loves is a football star
   ii) Any student who does not pass does not play
   iii) John is a student
   iv) Any student who does not study does not pass
   v) Anyone who does not play is not a football star.

   Prove that "If John does not study, then Mary does not love John" Resolution by Refutation.
5. A doctor is called to see a sick child. The doctor has prior information that 90% of sick children in that neighborhood have the flu, while the other 10% are sick with measles. Let F stand for an event of a child being sick with Flu and M stand for an event of a child being sick with measles. Assume for simplicity that there no other maladies in that neighborhood. A well-known (and common) symptom of measles is a rash and has probability of 0.95. [8]

   However, very occasionally, children with flu also develop rash and has probability of 0.08.

   Upon examining the child, the doctor finds a rash. What is the probability that the child has measles?
6. Explain Frames and Semantic Net with examples. List down their advantages and limitations. [4+4]
7. What is Fuzzy Logic and why is it important? Explain about Mamdani Fuzzy Inference Method with example. [3+7]
8. What do you understand by Perception? How can we design a neural network that acts as an XOR gate? [1+7]
9. Differentiate between declarative knowledge and procedural knowledge. Describe expert system with its architecture and practical uses. [3+5]
10. What s Natural Language processing? Explain the different steps in the natural language processing. [2+4]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2073 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. If the Turing Test is passed, does this show that computers exhibit intelligence? State your reasons. [7]
2. Solve the following puzzle by assigning numeral (0-9) in such a way that each letter is assigned unique digit which satisfy the following addition. [7]

   ONE + ONE + TWO = FOUR
3. Explain the necessity of searching techniques in AI? Differentiate between Breath first search and Depth first search with their performance criteria. [4+5]
4. Assume the following facts: [8]

   i) Horses, cows, pigs are mammals
   ii) An offspring of a horse is a horse
   iii) Bluebeard is a horse
   iv) Bluebeard is Charlie's parent
   v) Offspring and parent are inverse relations
   vi) Every mammal has a parent

   Prove Charlie is a horse using resolution refutation.
5. What is causal net? How does Bayes Theorem calculate the probability in a causal net? Explain with example calculation. [7]
6. Convert given sentences into Semantic Network. [7]

   i) The height of the adult male is 5.10
   ii) Baseball player is an adult male.
   iii) Adult male is a person.
   iv) Batting average of Baseball players is 0.252
   v) Pee-wee-Reese is a Fielder.
   vi) Fielder is Baseball player.
   vii) Team of pee-wee-Reese is Brooklyn Dodger.
7. "Learning is an essential characteristic for intelligent agents." List down justification on this statement. Write about the role learning with suitable example. [4+4]
8. What are applications of Expert System? Describe the Development stages of Expert System briefly. [2+6]
9. Define a NLU and a NLG. List down the different steps involved in the natural language processing (NLP) with suitable examples. [2+7]
10. Define Hebbian learning. Use Hebbian learning algorithm to Construct Hebbian Network which perform line AND Function. [3+7]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. If the Turing Test is passed, does this show that computers exhibit intelligence? State your reasons. [7]
2. What is a Constraint satisfaction problem? Solve the following crypto-arithmetic problem with necessary steps:

   LOGIC+LOGIC=PROLOG. [3+4]
3. Searching is an important part of AI, justify it. Explain any two types of blind search and compare them in terms of space and time complexity. [2+7]
4. What is a rule based reasoning? Explain Backward Chaining with suitable example. [7]
5. Using resolution solve the following statements: [7]

   All pompeian are Romans. All Romans were either loyal to Caesor or hated him. Everyone is loyal to someone. People only try to assassinate rulers they not loyal to. Marcus tried to assassinate Caesor. Marcus was pompeian. Find, did Marcus Caesor?
6. What are Frames and Semantic Net? Convert the given sentences in semantic Net. [7]

   i) A person is a mammal.
   ii) Sakti Gauchan is a person.
   iii) Person has nose.
   iv) Sakti Gauchan is in Nepalese team.
   v) Uniform color of sakti Gauchan is Red/Blue.
7. What is a machine learning? Explain genetic algorithm (GA) along with GA operators. List some of areas where GA can be applied. [2+6+2]
8. What do you understand by a perceptron? How can we design a neural network that acts as an OR gate. [2+7]
9. Differentiate between declarative knowledge and procedural knowledge. Describe expert system with its architecture and practical uses. [3+6]
10. Explain different steps involved in the natural language processing (NIP) with suitable block diagram and examples. [8]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2072 Ashwin

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is an Artificial Intelligence (AI)? Explain any two applications of AI in real field. [7]
2. What do you understand by Constraint satisfaction problem? Solve the following Crypt-arithmetic problem. [1+6]

```
  SEND
+ MORE
 MONEY
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3. What is a searching? Explain Breadth First Search and Depth First Search and compare their performance criteria. [9]
4. What is a knowledge, representation and reasoning? Describe forward chaining with practical example. [2+5]
5. Assume the following facts: [7]
   - 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.

   Prove that John likes peanuts using resolution refutation
6. What are semantic nets and frames? How frames are useful in semantic nets. [7]
7. What is a machine learning? Explain in detail about Boltzmann machines with suitable algorithm and explanations. [2+8]
8. What is a neural network? Explain the back propagation algorithms and perceptron. [2+4+4]
9. What is an expert system? Explain its advantages and disadvantages. [8]
10. What is a Natural Language Processing? Describe Natural Language Processing Steps and its application. [2+6]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2071 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Distinguish between knowledge and learning. What does acting humanly refer to? Explain. Define well defined problems. [2+5+1]
2. Solve the following cryptoarithmetic problem with necessary steps. [7]

   ONE + ONE + TWO = FOUR
3. How informed search is different from uniformed search? Explain min-max algorithm with suitable example, also discuss how alpha-beta is different from min-max algorithm. [2+4+3]
4. What is causal network? Explain reasoning in belief network with suitable example. [2+5]
5. What is neural network? Describe its types. A doctor knows that the disease meningitis causes the patient to have a stiff neck 50% of the time. The doctor also knows that the probability that a patient has meningitis is 1/50,000, and the probability that any patient has a stiff neck is 1/20. Find the probability that a patient with a stiff neck has meningitis? [3+5]
6. What is machine learning? Explain genetic algorithm along with different operators of genetic algorithm. [2+8]
7. What is Natural Language Processing (NLP)? Explain the syntactic, semantic and pragmatic analysis of NLP. [2+2+2+2]
8. Define expert system? Discuss about the general architecture of an expert system. [2+4]
9. How does machine vision help in Artificial Intelligence? Explain how back propagation algorithm helps in machine learning. [3+5]
10. Compare the followings: [3x3]
    a) Forward versus backward chaining
    b) Hopfield versus Kohonen network
    c) Analogy versus Inductive learning

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41 TRIBHUVAN UNIVERSITY
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Examination Control Division
2071 Bhadra

Exam.	Regular / Back		
Level	BE	Full Marks	80
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Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
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1. What is Artificial Intelligence (AI)? Discuss history of AI in brief. [2+5]
2. What is the advantage of depth limit search? Compare it with other search strategies. [4+4]
3. If X is on the top of Y, Y supports X. If X is above Y and they are touching each other, X is on the top of Y. A cup is above a book. A cup is touching a book. Show that supports (book, cup) is true. [8]
4. Give an example of learning by analogy. How knowledge can be represented using semantic network? Explain with suitable example. [1+7]
5. Explain Backward Chaining with suitable example. [7]
6. What is conceptual dependency? Explain some of common primitives used in conceptual dependency. [2+5]
7. What makes a problem "Well Defined"? Explain with a sample example of a state-space search framework. [3+4]
8. What is Artificial Neural Network (ANN)? Compare ANN with human brain with its functioning principle. [3+5]
9. Define knowledge acquisition with example. Explain the architecture of expert system. [2+6]
10. Compare the following: [4×3]
    a) Declarative versus Procedural Knowledge
    b) Pragmatic versus Phonetic Analysis
    c) Genetic algorithm based versus Fuzzy based learning

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Magh

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is Artificial Intelligence (AI)? Discuss brief history of AI with Chronological development. [2+6]
2. Why searching is necessary in AI? Explain about the role of production system with suitable example. [2+6]
3. What is horn clause? Differentiate between Depth First Search and Breadth First Search. [1+7]
4. Explain backward chaining with suitable example and compare with forward chaining. [4+4]
5. Why do we need FOPL? State any three rules of inference. How can we make the machine with learning capacity? [2+3+3]
6. Define Boltzmann Machine. How knowledge can be represented using semantic network? Explain with suitable example. [1+7]
7. What is Machine Learning? What is Fuzzy Logic? Explain the Fuzzy Inference with suitable example. [2+6]
8. Differentiate declarative knowledge and procedural knowledge. Explain the architecture of expert system. [2+6]
9. What is the role of perceptron in neural network? Explain about bakpropagation algorithm. [3+5]
10. What is Natural Language Processing (NLP)? Discuss the different issues related with NLP with example. [2+6]

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2070 Bhadra

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Define AI. When a machine is said to be passed Turing test? Give any two examples of constraint satisfaction problem. [2+5+1]
2. Solve the following crypto-arithmetic problem, where different letters denote different integers and identical letters denote same integer. WRONG + WRONG = RIGHT. Explain the steps that you have followed. [5+3]
3. Differentiate between informed and blind search. How depth search is different to breadth first search. Compare with evaluation parameters. [4+4]
4. All oversmart persons are stupid. Children of oversmart presons are naughty. Ram is children of Hari. Hari is oversmart. Show that Ram is naughty. Using FOPL based resolution method. [8]
5. Explain the step involved in conjunctive normal form (CNF) with suitable example. [8]
6. What is semantic net? Explain with suitable example. [8]
7. What is machine vision? Discuss about the algorithm of Genetic Algorithm. [2+6]
8. What is neural network? Explain back-propagation algorithm learning.. [4+4]
9. What is an Expert System? Explain the steps of an Expert System development. [4+4]
10. Define machine translation in NLP. Explain the challenges of machine translation. [1+7]

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TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2069 Poush

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. What is artificial intelligence (AI)? Explain the Turing and its importance in artificial intelligence. [7]

2. Solve the following crypto-arithmetic problem, where different letters denote different integers and identical letters denote same integer.
   RIGHT + RIGHT = WRONG
   Show all the step of solving through constrain satisfaction problem. [7]

3. What is blind search? Explain depth first search algorithm with an example and compare it with breadth first search. [9]

4. Explain all the steps involved in conversion of conjunctive normal form (CNF) with an example. [10]

5. What is a frame? Explain it with suitable example. [7]

6. What is genetic algorithm (GA)? Explain operator of GA with its importance. [10]

7. What is neural network? Differentiate between supervised and unsupervised learning. [6]

8. What is expert system? Explain general architecture of an expert system. [8]

9. What is natural language processing (NLP)? Explain different steps of NLP. [8]

10. Write short notes on: (any two) [4×2]
    a) Horn clause
    b) Machine vision
    c) Perceptron

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41 TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division.
2069 Bhadra

Exam.	Regular (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	III / II	Time	3 hrs.

Subject: - Artificial Intelligence *(CT 653)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

1. Discuss any two fields of your daily life where artificial intelligence has been applied. (7)
2. Solve the following crypto-arithmetic problem, where different letters denote different integers and identical letters denote same integer. LOGIC + LOGIC = PROLOG
   Show all the step of solving through constraint satisfaction problem. (7)
3. Discuss the hill-climbing search algorithm along with problems associated with it and discuss their solutions. (9)
4. Given premises: Every American who sells weapons to hostile nations is a criminal. The country Abc is enemy of America. All of the missiles in Abc were sold by John. John is an American.
   Proof: John is a criminal. (10)
5. What are the different knowledge representation models? Discuss semantic nets with an example. (7)
6. What is Fuzzy learning? Explain with a practical example. (4)
7. Explain the learning framework with suitable example. (6)
8. What is a Hopfield Network? Explain all the steps involved in the Hopfield Network with suitable example. (8)
9. Explain different steps of expert system development with an example. (8)
10. What is a natural language processing? Explain it. (6)
11. Write short notes: (any two) (4 x 2 = 8)
    i. Skolemization
    ii. Machine vision
    iii. Human Brain verses Neural Network

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