

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]

$$\begin{array}{r} \text{SEND} \\ + \text{MORE} \\ \hline \text{MONEY} \end{array}$$

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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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 persons 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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Exam.	New Batch (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCI	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. 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 backpropagation 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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Exam.	Old Back (2065 & Earlier Batch)		
Level	BE	Full Marks	80
Programme	BCT	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject: - Artificial Intelligence (EG743CT)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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- ✓ Assume suitable data if necessary.

1. Define Artificial Intelligence (AI)? Justify that "AI makes machine working more human friendly". [8]
2. Define expert system. What are the building blocks of expert system? [8]
3. Compare the search strategy of breadth first search with depth first search. [8]
4. Convert the following sentences in to FOPL and hence into CNF [8]
  - i. Everyone likes someone.
  - ii. All the students who visited science museum are not engineering student.
  - iii. Sumit likes all fruits that are rich vitamin A.
  - iv. Shyam likes all the movies that Krishna likes.
5. Explain learning framework with suitable example. [8]
6. What is backward chaining? Explain with suitable example. [8]
7. What are the different operators associated in genetic algorithm. [8]
8. Differentiate between supervised learning and unsupervised learning. [8]
9. Explain the different issues of Natural Language Processing (NLP). [8]
10. Explain different forms of knowledge modelling techniques. [8]

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**Subject: - Artificial Intelligence (CT 653)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
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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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1. Define and differentiate between "system that think like humans" and "system that act like humans". What are the ethical issues in the artificial intelligence?
  2. How can you convert to conjunctive normal form? Explain all the steps with suitable examples.
  3. "All married employees earning Rs. 225,000 or more per year in Nepal pay taxes. All unmarried employees earning Rs. 200,000 or more per year in Nepal pay taxes. The university professor of Nepal earns Rs. 400,000 and has to pay 25% taxes. No other employee earns more than the professor in the university. Some of Nepalese citizens earn less than Rs. 200 per day and they don't have to pay any taxes". Represent the above sentences in first-order logic and explain each step.
  4. Draw the block diagram of the structure of an expert system and explain it. How can you represent expert system using if-then rules?
  5. What is a depth first search? Explain it with required algorithm. How can you modify it to be an informed search?
  6. Explain in detail about ID3 process with suitable example. Explain different factors involved in the learning.
  7. What is a fuzzy logic and explain its importance? Explain the steps involved in the fuzzy logics.
  8. What is a McCulloch/Pitts neural network? Explain it with reference to AND gate. Justify that McCulloch/Pitts neural network can't be applied to EX\_OR gate.
  9. Explain in detail about forward chaining with suitable example. What are the applications of forward chaining?
  10. Explain the importances of natural language processing. What are the issues in the natural language processing?

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1. Justify that "system that thinks rationally" and "system that acts rationally" is important part of artificial intelligence with examples.
2. Explain all the steps involved in the conjunctive normal form with suitable practical examples. How can you realize it using suitable hardware?
3. "A key property of deductive systems is that they are purely syntactic, so that derivations can be verified without considering any interpretation. Thus a sound argument is correct in every possible interpretation of the language, regardless whether that interpretation is about mathematics, economics, or some other area." Represent the above sentences in first-order logic and explain each step.
4. What is an expert system? Draw the block diagram of an expert system and explain it. Explain the importance of if then rules in the expert system.
5. Justify that the application of queue is important in the searching. Explain any one informed search technique involving queue along with its algorithm.
6. What do you mean by ID3 process? Explain in detail about ID3 process with suitable example.
7. Justify that the study of gene is one of the important part in the AI. Explain the steps involved in the genetic algorithm.
8. What do you mean by supervised learning? Explain any one type of supervised learning with practical example.
9. What do you mean by forward chaining? Explain it with suitable block diagram. Differentiate it with backward chaining.
10. Differentiate between natural language understanding and natural language generating. Explain the different steps in the natural language processing.

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1. What do you mean <sup>by</sup> data driven reasoning? How can you relate with chaining? Explain it with practical examples.
  2. Is Turing test important in the artificial intelligence? Explain it with suitable diagram and examples.
  3. What is a first order predicate logic? How do you convert it to the disjunctive normal form? Explain with suitable examples.
  4. "The Department of Electronics and Computer Engineering offers two undergraduate degrees, Computer Engineering and Electronics and Communication Engineering. Almost 75% of those courses are similar. If the students of any of those engineering study another one year more can be eligible to get both degrees. Only some of them may be interested to get Bachelor in Computer, Electronics and Communication Engineering". Represent the above sentences in first-order predicate logic and explain each step.
  5. Justify that informed search is the modification of blind search. Explain in detail about simulated annealing with practical examples.
  6. Differentiate between supervised and unsupervised learning. Explain about learning framework with suitable block diagram and examples.
  7. What is a Boltzmann machines? Explain its algorithm with suitable explanation and example.
  8. What do you mean by hetero-associative structure? Explain it with suitable example and its limitation.
  9. Compare expert systems and human experts. Explain each point with suitable practical examples.
  10. Justify that natural language processing is one of the important part of an artificial intelligence. Explain the steps involved in the natural language processing.



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1. What do you mean by forward chaining? Why it is required? Explain it with two practical examples.
2. Justify that "System that think rationally" and "System that act rationally" are the part of artificial intelligence. Explain it with practical examples.
3. How do you convert to conjugate normal form? Explain all the steps with suitable practical examples.
4. "A deductive system is sound if any formula that can be derived in the system is logically valid. Conversely, a deductive system is complete if every logically valid formula is derivable. All of the systems discussed in this article are both sound and complete. They also share the property that it is possible to effectively verify that a purportedly valid deduction is actually a deduction; such deduction systems are called *effective*". Represent the above sentences in first-order logic and explain each step.
5. Justify that AI can't exist without searching. Explain in detail about any two types of informed search with practical examples.
6. Why do we require learning? Explain about learning framework with suitable block diagram and examples.
7. How a genetic idea can be converted to an algorithm? Explain all steps of genetic algorithm in brief.
8. What is a Hopfield Network? Explain all the steps involved in the Hopfield Network with suitable example. Compare it with Kohonen Network.
9. Why do we require expert system structure? Draw the block diagram and explain it with practical examples.
10. Explain the different steps involved in the natural language processing (NLP) with suitable block diagram and examples.

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1. Define and differentiate between "system that think rationally" and "system that act rationally". AI research is ethical justify it.
2. Why conjunctive normal form is required? Explain all the steps with suitable practical examples.
3. "All married employees earning Rs. 140,000 or more per year in Nepal pay taxes. All unmarried employees earning Rs. 115,000 or more per year in Nepal pay taxes. The president of Nepal earns Rs. 2,500,000 and has to pay maximum taxes. No other employee earns more than the president. Some of Nepalese citizens earn less than Rs. 100 per day and they don't have to pay any taxes". Represent the above sentences in first-order logic and explain each step.
4. Briefly explain different types of practical expert systems. Explain in detail about any one practical expert system used in the medical application.
5. Justify that AI can't exist without searching. Explain in detail about hill climbing searching and compare it with simulated annealing method.
6. Explain different factors involved in the learning? Explain in detail about ID3 process with suitable example.
7. What is a genetic algorithm and explain its importance? Explain the steps involved in the genetic algorithm.
8. Compare between computer and brain. Differentiate between supervised and unsupervised learning with suitable example.
9. Is an expert system important, justify it. Explain in detail about forward chaining with suitable example.
10. Why you have to study natural language processing? Explain the issues in the natural language processing.

**Examination Control Division**  
2065 Kartik

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1. Define an artificial intelligence (AI). Explain the behaviors of the AI. What do you mean by Turing test? Explain it.
2. Why disjunctive normal form is required? Explain all the steps with suitable practical examples.
3. "A person born in Nepal, and whose parents is a Nepali citizen by birth, is a Nepali citizen by birth. A person born outside Nepal, and one of whose parents is a Nepali citizen by birth, is a Nepali citizen by descent. Several developed countries have dual citizenship provision, but Nepal doesn't have that provision". Represent the above sentences in first-order logic and explain each step.
4. Differentiate between inference and reasoning. Why probabilistic reasoning is important in the AI? Explain with suitable example.
5. Justify that searching is one of the important part of AI. Explain in detail about depth first search and breadth first search techniques with suitable example.
6. Define learning. Why learning frame work is required? Explain about learning frame work with suitable block diagram and examples.
7. What is a genetic algorithm? Explain its applications. Explain all steps of GA in brief.
8. What is a back propagation? Explain all the steps involved in the back propagation with suitable example.
9. How can you construct expert system? Explain knowledge engineering with suitable block diagram.
10. Define a natural language processing. Explain the different issues involved in the natural language processing.

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1. List all categories of artificial intelligence and explain them with suitable examples.
2. Why conversion to clausal form is required? Explain all the steps with suitable examples.
3. Justify that "MYCIN" is a probabilistic reasoning with derivations and example.
4. Explain the importance of searching. Explain in detail about any two informed search techniques with suitable example.
5. What is an inductive learning? Why learning frame is required? Explain with suitable block diagram and examples.
6. Explain about semantic networks and frames with suitable examples.
7. Define a genetic algorithm and explain its importance. Explain different steps of genetic algorithm in brief.
8. Explain how brain works. Explain the mathematical representation of neural network system along with its algorithm.
9. Define an expert system. Differentiate between forward chaining and backward chaining with suitable examples.
10. Why natural language processing is required? Explain the issues in information extraction, information retrieval and machine translation in the natural language processing.