KATHMANDU UNIVERSITY
End-Semester Examination
August, 2019

Marks scored:

Level : B.Sc.
Year : IV
Course : COMP 472
Semester : I

Exam Roll No. :
Time: 30 mins.
F.M. : 10

Registration No.:
Date AUG 2 1 2019

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. The capabilities of computer to adapt to new circumstances and to detect and extrapolate patterns is called
   a. Automated reasoning
   b. Knowledge representation
   c. Natural language processing
   d. Machine learning

2. Which of the following foundations of AI deals with the question "Can formal rules be used to draw valid conclusions?"
   a. Mathematics b. Neuroscience c. Philosophy d. Psychology

3. If an agent's sensors give it access to the complete state of the environment at each point in time, then we say that the task environment is fully
   a. Deterministic b. Stochastic c. Sequential d. Fully observable

4. Robot machine might have cameras and infrared range finders for..... and various motors of..... .
   a. Sensors, Agents
   b. Agents, Actuators
   c. Sensors, Actuators
   d. Actuators, Sensors

5. The process of deciding what action and states to consider, given a goal is called
   a. Problem formulation
   b. Goal formulation
   c. Search
   d. Solution

6. Which search is implemented with an empty first-in-first-out queue?
   a. Depth-first search
   b. Bidirectional search
   c. Breadth-first search
   d. A* search

7. If b is the branching factor and d is the depth of the shallowest solution then the time complexity of bidirectional search is
   a. $O(b^{d/2})$ b. $O(b^{d+1})$ c. O(bd) d. $O(b^d)$

8. A problem in which the uncertainty is caused by the actions of another agent is called
   a. Sensorless problems
   b. Adversarial
   c. Conformant problems
   d. Exploration problems

9. In the following relation where symbols have their usual meaning, which of the following relation is related to triangle inequality in A* search
   a. $h(n) \leq c(n,a,n') + h(n')$
   b. $f(n) \leq g(n) + h(n) \leq C^*$
   c. $f(n) \leq C^*$
   d. $f(n) \leq c(n,a,n') + h(n')$

10. Which is not a property of representation of knowledge?
    a. Representational Verification
    b. Representational Adequacy
    c. Inferential Efficiency
    d. Inferential Adequacy

11. Which of the following is not a Horn clause?
    a. $(\neg L_{1,1} \vee Breeze \vee B_{1,1})$
    b. $(B_{1,1} \vee P_{1,2} \vee \neg P_{2,1})$
    c. $(\neg L_{1,1} \vee Breeze \vee B_{1,1})$
    d. $(\neg B_{1,1} \vee \neg P_{1,2} \vee \neg P_{2,1})$

12. Which of the following statement is a proposition?
    a. What is the time now?
    b. Get me a glass of water
    c. What is the time now?
    d. The only odd prime number is 2

13. If α,β,γ are arbitrary sentences of propositional logic then the condition of logical equivalence for implication elimination is
    a. $(\alpha \rightarrow \beta) \equiv (\alpha \vee \neg\beta)$
    b. $(\alpha \rightarrow \beta) \equiv (\neg\alpha \vee \beta)$
    c. $(\alpha \rightarrow \beta) \equiv (\neg\alpha \vee \neg\beta)$
    d. $(\alpha \rightarrow \beta) \equiv \neg(\neg\alpha \vee \neg\beta)$

14. Let P : This is a great movie, Q: You should not come back here
    Then 'This is a great movie and you should come back here.' is best represented by:
    a. $\neg P \vee \neg Q$ b. $P \wedge \neg Q$ c. $P \vee \neg Q$ d. $P \wedge Q$

15. What is the logical translation of the statement "None of my friends are perfect"?
    a. $\exists x(\neg F(x) \wedge P(x))$ b. $\exists x(F(x) \wedge \neg P(x))$ c. $\neg\exists x(F(x) \wedge P(x))$ d. $\exists x(\neg F(x) \wedge \neg P(x))$

16. What will backward be chaining algorithm will return?
    a. Substitutes matching the query
    b. Additional statements
    c. Logical statements
    d. All of the mentioned

17. Which of the following is not the promise of artificial neural network?
    a. It can survive the failure of some nodes
    b. It has inherent parallelism
    c. It can explain result
    d. It can handle noise

18. Fuzzy set theory defines fuzzy operators. Choose the fuzzy operators from the following
    a. AND b. NOT c. OR d. All of the mentioned

19. A 3-input neuron is trained to output a zero when the input is 110 and a one when the input is 111. After generalization, the output will be zero when and only when the input is:
    a. 000 or 110 or 011 or 101
    b. 010 or 100 or 110 or 101
    c. 000 or 010 or 110 or 100
    d. 100 or 111 or 101 or 001

20. Which of the following is a representation learning algorithm?
    a. Neural network
    b. Random Forest
    c. k-Nearest neighbor
    d. None of the above

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SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Define AI. When a machine is said to be passed Turing test?

2. Give the PEAS description about automated taxi driven system.

3. How does alpha beta pruning help in searching? Explain with example.

4. Describe about constraint satisfaction problem with suitable example.

5. The law says that it is a crime for an American to sell weapons to hostile nations. The country Nono, an enemy of America, has some missiles, and all of its missiles were sold to it by Colonel West, who is American. Prove that Col. West is a criminal.

6. How does belief network help in reasoning? Explain with suitable example.

7. What is deep learning? How does regularization helps to reduce overfitting?

SECTION "C"
[2 Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8. What is Artificial Neural Network? Define its mathematical model. Discuss how back propagation algorithm is used to train ANN?

9. Justify the importance of searching in AI. Explain in detail about A* search with example and also discuss about its admissibility and optimality.

10. What is script? How knowledge is represented in script? Illustrate components of scripts with example.