KATHMANDU UNIVERSITY
End Semester Examination [C]
May/June, 2019

Mark Scored:

Level : B.E./B.Sc.
Year : IV

Course : COMP 472
Semester: I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 03 JUN 2019

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose the most appropriate answer among the given options and mark [X] in the box of your choice.

1. Which is not a property of representation of knowledge?
   [ ] Representational Verification [ ] Representational Adequacy
   [ ] Inferential Adequacy [ ] Inferential Efficiency

2. The sentence model "$(p \wedge (q \Rightarrow r)) \Leftrightarrow ((\neg p \vee q) \Rightarrow (p \wedge r))$" can be viewed as
   [ ] UnsSatisfiable [ ] satisfiable [ ] Valid [ ] illegal

3. In which agent does the problem generator is present?
   [ ] Learning agent [ ] Observing agent [ ] Reflex agent [ ] None of the mentioned

4. The environment for the WUMPUS WORLD is characterize as one of the following combination.
   [ ] Partially observable, Deterministic, Sequential
   [ ] Fully observable, Deterministic, Episodic
   [ ] Partially observable, Stochastic, Sequential
   [ ] Fully observable, Deterministic, Sequential

5. Which one of the following characteristics might not present in order to pass the turing test?
   [ ] Natural Language Processing [ ] Automated Reasoning
   [ ] Machine vision [ ] Knowledge Representation

6. In the model where P implies Q and the contradiction of Q exist, then it infer contradictory of P is explained by
   [ ] Modus Ponen [ ] Modus Tollen
   [ ] AND elimination [ ] Resolution refutation

7. The model "$S_1 \Rightarrow S_2$ "is FALSE iff
   [ ] S_1 is false or S_2 is false [ ] S_1 is false or S_2 is true
   [ ] S_1 is true or S_2 is false [ ] S_1 is true or S_2 is true

8. Rationality at any given time does not depend on___
   [ ] Performance measure that defines the criteria of success
   [ ] Agents' Prior knowledge of the environment
   [ ] The agent that can think
   [ ] The agent that can perform

9. The model $(A \wedge (A \Rightarrow B)) \Rightarrow B$ is _____
   [ ] Valid [ ] satisfiable [ ] unsatisfiable [ ] invalid

10. The value of "E" for the solution of the crypto arithmetic puzzle (SEND+MORE=MONEY) is
[ ] 5 [ ] 6 [ ] 7 [ ] 8

11. Which one of the following is equivalent with the model "$B_{1,1} \Leftrightarrow (P_{1,2} \vee P_{2,1})$" ?
[ ] $(\neg B_{1,1} \vee P_{1,2} \vee P_{2,1}) \wedge (\neg P_{1,2} \vee B_{1,1}) \wedge (\neg P_{2,1} \vee B_{1,1})$
[ ] $(\neg B_{1,1} \vee P_{1,2} \vee P_{2,1}) \vee (\neg P_{1,2} \vee B_{1,1}) \vee (\neg P_{2,1} \vee B_{1,1})$
[ ] $(\neg B_{1,1} \vee P_{1,2} \vee P_{2,1}) \wedge (\neg P_{1,2} \vee B_{1,1} \vee \neg P_{2,1} \vee B_{1,1})$
[ ] $(\neg B_{1,1} \vee P_{1,2}) \vee (P_{2,1} \wedge \neg P_{1,2} \vee B_{1,1}) \wedge (\neg P_{2,1} \vee B_{1,1})$

12. The time and space complexity for the "minimax" algorithm where all the letters have usual meaning.
[ ] $O(b^m)$ and $O(b_m)$ [ ] both $O(b^m)$
[ ] both $O(b_m)$ [ ] $O(b_m)$ and $O(b^m)$

13. Which one of the following symbol is not the basic syntactic elements of the first order logic?
[ ] Connection symbols [ ] constant symbols
[ ] predicate symbols [ ] function symbols

14. The FOL sentence "$\exists x$ Likes(x,Broccoli)" can be represented equivalently as_____.
[ ] $\forall x \neg$Likes(x,Broccoli) [ ] $\neg \forall x \neg$Likes(x,Broccoli)
[ ] $\exists x \neg \forall x$ Likes(x,Broccoli) [ ] $\neg \forall x \exists x$ Likes(x,Broccoli)

15. Which of the following is a problem that occurs in hill climbing?
[ ] Cliff [ ] Ridge [ ] Valley [ ] Rock slide

16. The sentences "Everyone in the world is loved by at least one person" can be represented in FOL as ____.
[ ] $\forall y \exists x$ Loves(x,y) [ ] $\exists x \forall y$ Loves(x,y)
[ ] $\neg \forall x \neg \exists y$ Loves(x,y) [ ] $\neg \exists x \exists y$ Loves(x,y)

17. A* algorithm is based on
[ ] Breadth-First-Search [ ] Depth-First –Search
[ ] Best-First-Search [ ] Hill climbing.

18. Which of the following is a proposed means of testing the intelligence of a machine?
[ ] Semantic analysis [ ] Production system
[ ] Syntactic analysis [ ] Turing test

19. Agent that tries to maximize their own expected happiness is called_____.
[ ] Reflex agent [ ] Model based agents
[ ] goal based agents [ ] Utility-based agents

20. What is another name for an expert system?
[ ] Neural network [ ] Intelligent agent
[ ] Knowledge-based system [ ] none of the mentioned.

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Semester: I
F. M. : 40

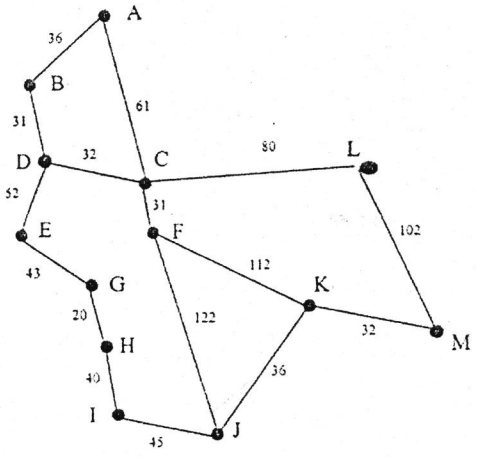
SECTION "B"
[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

1. A budget airline company operates 3 planes and 5 cabin crew employees. Only one crew can operate on any plane on a single day and each crew cannot work for more than two days in a row. The company uses all the planes every day. Considering the scenario, suggest the genetic algorithm to implement for the best solution. Note that you have to indicate the chromosomes representation, its size, fitness function, number of solutions and the terminating criteria.

2. Apply perceptron learning algorithm to classify the following three dimensional unipolar patterns before augmentation.
Class A :{x}={(0,0,0),(1,1,1)}
Class B :{x}={(0,0,1),(0,1,1)}
Draw a figure of the perceptron obtained with its connection weights and threshold.

3. How do you differentiate the term "Heuristics" and "Admissible Heuristics"? Consider the A* algorithm to work out a route from town A to town M. Use the available G(n) and H(n) to calculate F(n) for each of the state considered and construct the search tree for the solution. State the time and space complexity of the algorithm used.



Straight Line Distance to M

A	223
B	222
C	166
D	192

E	165
F	136
G	122
H	111

I	100
J	60
K	32
L	102

M	0

SECTION "C"
[6Q. × 4 = 24 marks]

Attempt *ALL* questions.

4. Describe PEAS for the "Soccer Playing Agent" and a "Sweater Knitting Agent".

5. Describe the "Laws of Thought" to define the artificial intelligence.

6. What are the different types of problem? Discuss the problem formulation techniques in AI.

7. Plateau, Peaks and Ridges all cause problems for hill climbing search. What does this mean? Explain.

8. A sentence α can be derived from *Knowledge Base by* procedure *i*. Define the *soundness* and *completeness* of the procedure *i*.

9. Convert the following English sentences into the FOPL.
   a. Every person likes every food.
   b. For every food there is a person who likes a food.
   c. There is a person who likes every food.
   d. Some person likes some food.