KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

Marks 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 : MAR 0 8 2018

SECTION "A"
[20 Q.×0.5=10 marks]

Pick the correct answer(s)

1. Which method is effective for escaping from local minima?
   [ ] Updating heuristic estimate [ ] Reducing heuristic estimate
   [ ] Eliminating heuristic estimate [ ] None of the mentioned

2. How does the Agent behavior can be best described?
   [ ] Perception sequence [ ] Agent function
   [ ] Environment in which agent is performing [ ] Sensors and Actuators

3. On which one of the following point rationality at any given time does not depend?
   [ ] The performance measure that defines the criterion of success
   [ ] The agent's prior knowledge of the environment
   [ ] The actions that the agent can perform
   [ ] The upcoming result of the action that has been done.

4. Which one of the following component does not describe the problem best?
   [ ] Initial state [ ] Abstract state
   [ ] Goal state [ ] Successor state

5. An agent, which percept the environment is composed of _____
   [ ] Architecture [ ] Agent Function
   [ ] Perception Sequence [ ] Architecture and Program

6. What is the heuristic function of greedy best-first search?
   [ ] f(n) != h(n) [ ] f(n) < h(n) [ ] f(n) = h(n) [ ] f(n) > h(n)

7. Translate the following statement into FOL.
   "For every a, if a is a philosopher, then a is a scholar"
   [ ] ∀ a philosopher(a) scholar(a)
   [ ] ∃ a philosopher(a) scholar(a)
   [ ] ∃ a philosopher(a) ∀ a scholar(a)
   [ ] None of the mentioned

8. Which of the following does not include factors affect the performance of learner system?
   [ ] Training scenario [ ] Type of feedback
   [ ] Good data structures [ ] Learning algorithm

9. Which is transposition rule?
   [ ] From P → Q, infer ~Q → P [ ] From P → Q, infer Q → ~P
   [ ] From P → Q, infer Q → P [ ] From P → Q, infer ~Q → ~P

10. Which form is called as disjunction of conjunction of literals?
[ ] Conjunctive normal form [ ] Disjunctive normal form
[ ] Normal form [ ] All of the mentioned

11. 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:
[ ] 000 or 010 or 110 or 100 [ ] 000 or 110 or 011 or 101
[ ] 010 or 100 or 110 or 101 [ ] 100 or 111 or 101 or 001

12. An algorithm A is admissible if
[ ] It is not guaranteed to return an optimal solution when one exists
[ ] It is guaranteed to return an optimal solution when one exists
[ ] It returns more solutions, but not an optimal one
[ ] It guarantees to return more optimal solutions

13. What are you predicating by the logic: ∀x: ∈y: loyalto(x, y).
[ ] Everyone is loyal to someone [ ] Everyone is loyal to all
[ ] Everyone is not loyal to someone [ ] Everyone is loyal

14. A 4-input neuron has weights 1, 2, 3 and 4. The transfer function is linear with the constant of proportionality being equal to 2. The inputs are 4, 10, 5 and 20 respectively. The output will be:
[ ] 238 [ ] 76 [ ] 119 [ ] 123

15. What is Web Crawler? (Web Crawling is type of search for a relevant document from a given seed documents. Focused crawlers exists, helps to improvise the search efficiency.)
[ ] Intelligent goal-based agent [ ] Problem-solving agent
[ ] Simple reflex agent [ ] Model based agent

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

17. What is used in determining the nature of the learning problem?
[ ] Environment [ ] Feedback
[ ] Problem [ ] All of the mentioned

18. What is the space complexity of Depth-first search?
[ ] O(b) [ ] O(bl) [ ] O(m) [ ] O(bm)

19. If "A" is Knowledge base (KB) consisting of set of statements and "B" is inference, deriving a new sentence from the KB then choose the correct option.
[ ] A is true, B is true [ ] A is false, B is false
[ ] A is true, B is false [ ] A is false, B is true

20. How do you represent "All dogs have tails".
[ ] ∀ x: dog(x) ⇒hastail(x) [ ] ∀ x: dog(x) ∧hastail(y)
[ ] ∀ x: dog(y) ⇔hastail(x) [ ] ∀ x: dog(x) ⇒has□tail(x)

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SECTION "B"
[2 Q.×8=16]

Attempt *any TWO* questions.

1. You are going to implement genetic algorithm to find the solution for **X** in the model **f(x) = {MAX(x^2): 0 <= x <= 32}.** Discuss the population representation cross over point, crossover rate, selection criteria, fitness function, mutation rate, solution to some generation and also the optimization criteria.

2. What do you understand by artificial neural network? Explain how a perceptron model learns with the help of simulating a logical OR gate.

3. Justify that searching is one of the important part of AI. Explain in detail about depth first search and its different modifications to achieve the better solution path to goal state with an example.

SECTION "C"
[6Q.×4=24]

Attempt *ALL* questions.

4. What is 'Turing Test'in Artificial Intelligence (AI)? Criticize the performance of the 'Turing Test' to measure the intelligence of the machine.

5. Define Learning. Why learning frame work is required? Explain about learning frame with block diagram and examples

6. Both the performance measure and the utility function measure how well an agent is doing. Explain the difference between the two with the suitable examples.

7. If the wind continues, then the storm will be generated. If wind continues and the storm is generated, then the building will collapse. If continuation of wind will collapse the building, then a steel frame building is not appropriate for the town. Either a steel frame building is appropriate for the town or the civil engineers have made a mistake. Prove using inference the civil engineers have made a mistake

8. Translate the following sentence into first order logic :
   a. "Everyone's DNA is unique and is derived from their parents' DNA".
   b. "No dog bites a child of its owner".
   c. "Every gardener likes the sun".
   d. "All purple mushrooms are poisonous".

9. Convert the following expressions into CNF form.
   a. $((P \wedge Q) \vee (R \wedge S)) \vee (\neg Q \wedge (P \vee T))$
   b. $P \Rightarrow ((Q \Rightarrow R) \vee \neg S)$