

END SEMESTER EXAMINATION  
End Semester Examination  
March/April, 2017

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 : APR 03 2017

SECTION "A"  
[20 Q.×0.5=10 marks]

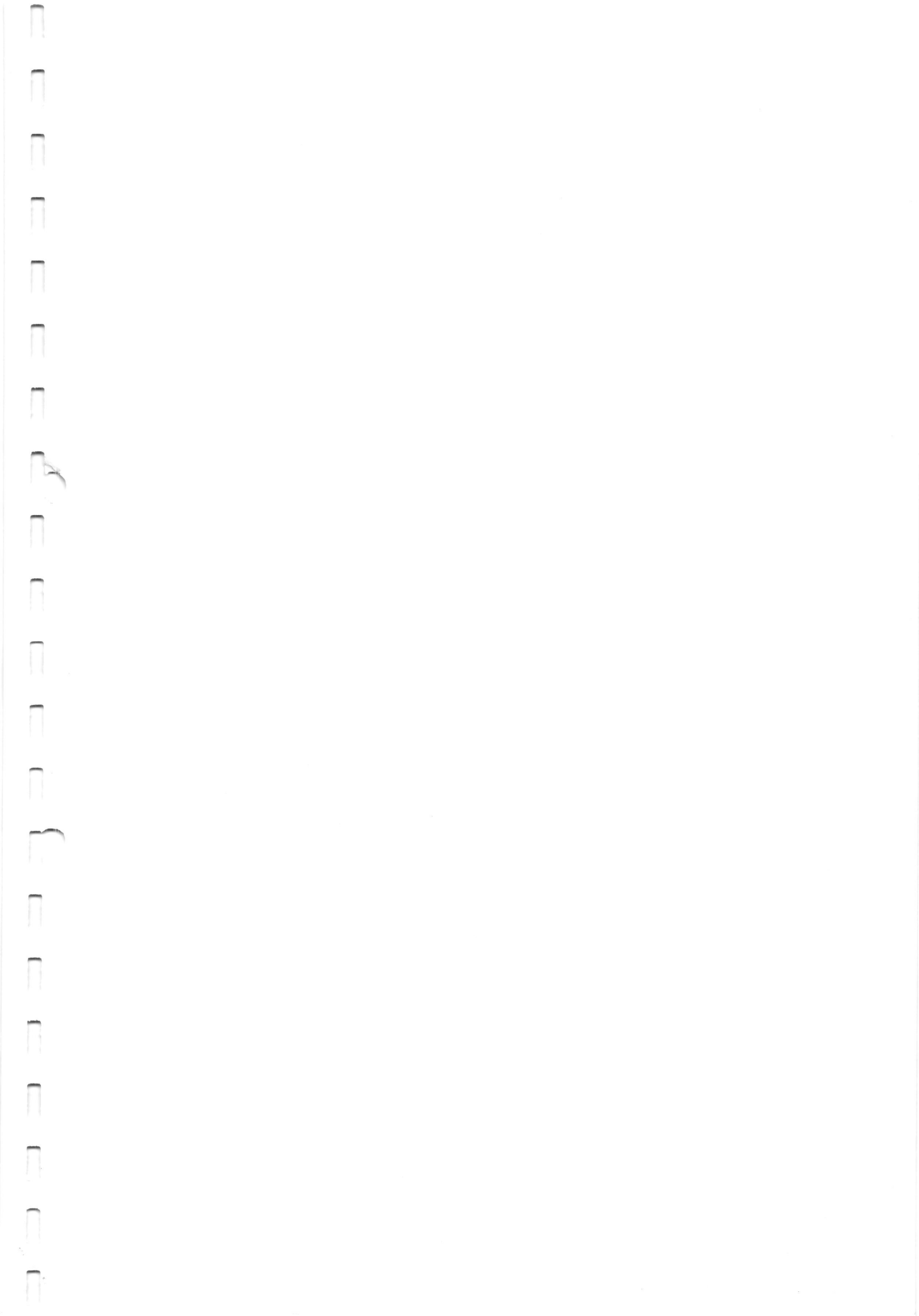
Choose the correct answer.

1. 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
2. What is an auto-associative network?  
 a neural network that contains no loops  
 a neural network that contains feedback  
 a neural network that has only one loop  
 a single layer feed-forward neural network with pre-processing
3. The "laws of thought" approach defines Artificial Intelligence as a machine that \_\_\_\_\_  
 Thinks like human                       Acts like human  
 Thinks rationally                       Acts rationally.
4. 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
5. What is the best example of Automated Taxi driver Agent?  
 Supervised Learning                       Unsupervised Learning  
 Reinforcement Learning                       Inductive Learning
6. What is the equivalent of The sentence  $\exists xP$ ?  
  $\neg\forall x\neg P$                         $\neg\forall xP$                         $\forall xP$                         $\neg\exists x\neg P$
7. The environment of a taxi driver agent can be best describe as  
 Fully Observable, stochastic, sequential dynamic  
 Partially Observable, deterministic, sequential episodic  
 Partially Observable, stochastic, sequential dynamic  
 Fully Observable, stochastic, sequential semi dynamic

8. The 3-input neuron is trained to output a zero(0) for the odd number of 1's input and after generalization the output will be zero(0) when and only when the input is  
 000 or 001 or 011 or 100 or 110 or 111  
 101 or 001 or 010 or 100 or 110 or 111  
 000 or 001 or 010 or 100 or 110 or 111  
 000 or 001 or 010 or 100 or 101 or 111
9. When did Alan Turing Propose the Turing Test in order to test the intelligence of a machine?  
 1950                       1956                       1958                       1960
10. In the model where P implies Q and the contradiction of Q exist, then it infer contradictory of P is explained by  
 Modus Ponon     Modus Tollen  
 AND elimination     Resolution refutation
11. Which one of the following parameter is not the ontological commitment of the FOPL?  
 Facts                       Objects                       Time                       Relation
12. Which one of the following propositional logic can best describe the English sentence "An object is poisonous unless it is purple"?  
 Poisonous  $\Leftarrow$  purple     Poisonous  $\Rightarrow$  purple  
 Poisonous  $\Rightarrow \neg$ purple     Poisonous  $\Leftrightarrow$  purple
13. The propositional logic sentence  $(p \wedge (q \Rightarrow r)) \Leftrightarrow ((\neg p \vee q) \Rightarrow (p \wedge r))$  seems to be \_\_\_\_\_  
 Valid                       satisfiable                       Unsatisfiable                       illegal
14. If a computer can open 1000nodes per second, The estimated time for Breadth First search algorithm to open a youngest node( with a branching factor=10 and depth level 6) is \_\_\_\_\_  
 11 seconds                       19 minutes                       31 hours                       129 days
15. The value of "N" for the solution of the crypto arithmetic puzzle (SEND+MORE=MONEY) is  
 5                       6                       7                       8
16. Which one of the following parameter has likely to have very low rate of occurrence in Genetic Algorithm?  
 Selection     Crossover  
 Mutation     All has equal probability
17. If b is the branching factor and d is the depth of the goal node the space complexity of the depth first search algorithm can be expressed in Big O notation as \_\_\_\_\_  
  $O(b^{d+1})$                         $O(b^{d/2})$                         $O(bd)$                         $O(b^d)$

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18. In the general model of the learning agent the learning element uses the feedback from \_\_\_\_\_ on how the agent is doing and determines how the \_\_\_\_\_ should be modified.
- Problem Generation and Critic
  - Performance Element and Problem Generation
  - Critic and Performance Element
  - Problem Generation and Critic
19. Which one of the following characteristics might not present in order to pass the turing test?
- Natural Language Processing
  - Machine vision
  - Automated Reasoning
  - Knowledge Representation
20. The interdisciplinary fields of cognitive science defines the Aritificial Intelligence as machine that \_\_\_\_\_
- Thinks like human
  - Thinks rationally
  - Acts like human
  - Acts rationally.



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Time : 2 hrs. 30 mins.

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Semester: I  
F.M. : 40

SECTION "B"  
[2 Q.×8=16 marks]

Attempt *ANY TWO*.

1. Can a single neuron learn a task? Explain your answer with a suitable two input Perceptron model simulating an logical AND GATE with a learning rate  $\alpha$  0.1 and threshold  $\theta$  0.2 (for your simplicity take initial weight to be 0.3 and -0.1 and the activation function as given below where  $x_j$  is the input  $w_j$  is the weight and  $Y(p)$  is the output variable)

$$Y(p) = \text{step} \left[ \sum_{i=1}^n x_i(p) w_i(p) - \theta \right]$$

2. Suppose *Arad* is the start node and *Hirsova* is the goal node in the figure 1. below. Explain the searching mechanism of the following in detail with reference to the figure and find the solution(the numerical value in the figure is the actual path cost between the town cities ,assume necessary admissible heuristic value wherever required)

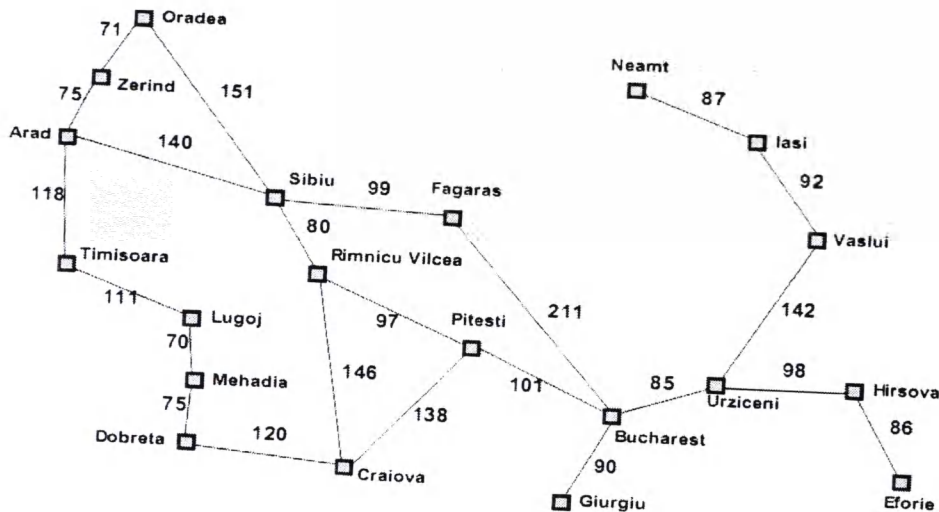


Fig. 1

- a. Greedy best first search  
b. A\* search
3. What is rational Agent? How does the nature of an autonomous agent deviate from a rational learning agent? Describe the PEAS for the English tutor Agent.

SECTION "C"  
[6 Q.×4=24 marks]

Attempt *ANY SIX*.

4. Explain the structure of utility based agent. Explain why simple reflex agent cannot plan ahead.
5. How do you define the admissibility and monotonicity of any heuristics? Prove that A\* algorithm is optimal for any admissible heuristics.
6. What is 'Turing Test' in Artificial Intelligence (AI)? Evaluate the performance of the 'Turing Test' to measure the intelligence of the machine.
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 it's owner".
  - c. "Every gardener likes the sun".
  - d. "All purple mushrooms are not poisonous".
9. Define state space search. Represent the states space for popular missionaries and cannibal games and traverse up to the goal state with only valid state consideration.
10. Explain the features of Genetic Algorithm? Give a brief implementation technique of genetic algorithm in TSP problem.