

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI (RAJ.)

CE F417
Date:12.10.2017

Application of Artificial Intelligence in Civil engineering
Mid Semester Examination

Duration: 90mts
MM: 100

Q.1 A flat plate which is covered with both laminar and turbulent boundary layer, the average drag coefficient C_f is calculated

as follows:
$$C_f = \frac{0.074}{Re_L^{1/5}} - \frac{A}{Re_L}$$

Formula is valid for the values of Re_L ranges from 5×10^5 to 10^7 . The constant A depends the value of the Reynolds number Re_x at which the laminar boundary layer becomes turbulent. The values of A for various values of critical Reynolds number are given below

Critical $(Re)_x$	3×10^5	5×10^5	10^6	3×10^6
Constant A	1050	1700	3300	8700

- Choose a proper ANN architecture. Justify it
- Create max. possible training data points with the help of data given.
- Calculate the values of weightages (min. 3 Epoch)
- Calculate the value of constant A for critical $Re_x = 9 \times 10^5$

Q.2 (a) For a network, prepare a rule based Expert system to calculate the Total floats.
(b) For the given network, prepare the rules to calculate the Total Floats for each activity.

Activity	Duration	Activity	Duration
1-2	6	4-3	5
1-3	8	2-5	12
1-4	5	3-5	8
2-3	0	4-5	6

- Get the total float of activity 2-3; Use backchaining, show all the changes in dynamic memory, rule stack, and goal stack
- Write all the notations you shall be using to define the system
- Write all the rules clearly

Q.3. Choose the best alternative

- From which rule does the modus ponens are derived?
a) Inference rule b) Module rule c) Both a & b d) None of these
- What is the goal of artificial intelligence?
(a) To solve real-world problems (b) To solve artificial problems
(c) To explain various sorts of intelligence (d) To extract scientific causes
- What are you predicating by the logic: $\forall x: \exists y: \text{loyalto}(x, y)$.
(a) Everyone is loyal to someone (b) Everyone is loyal to all
(c) Everyone is not loyal to someone (d) Everyone is loyal
- Which is not a type of First Order Logic (FOL) Sentence?
(a) Atomic sentences (b) Complex sentences (c) Quantified sentence (d) Quality Sentence
- Which search method takes less memory?
(a) Depth-First Search (b) Breadth-First search (c) Both (a) and (b) (d) Linear Search.

6. Which is not the commonly used programming language for AI?

- (a) PROLOG (b) Java (c) LISP (d) Perl

7. How do you represent "All dogs have tails".

- (a) $\forall x: \text{dog}(x) \rightarrow \text{hastail}(x)$ (b) $\forall x: \text{dog}(x) \rightarrow \text{hastail}(y)$
(c) $\forall x: \text{dog}(y) \rightarrow \text{hastail}(x)$ (d) $\forall x: \text{dog}(x) \rightarrow \text{has} \rightarrow \text{tail}(x)$

8. In an Unsupervised learning

- (a) Specific output values are given (b) Specific output values are not given
(c) No specific Inputs are given (d) Both inputs and outputs are given

9. Forward chaining systems are _____, where as backward chaining systems are _____.

- a) Goal-driven, goal-driven b) Goal-driven, data-driven
c) Data-driven, goal-driven d) Data-driven, data-driven

10. The main components of the expert systems is/are,

- a) Inference Engine b) Knowledge Base c) Only a) d) Both a) & b)

11. Following are the elements, which constitutes to the frame structure.

- a) Facts or Data b) Procedures and default values
c) Frame names d) (a) and (b)

12. 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

13. A perceptron is:

- a) a single layer feed-forward neural network with pre-processing b) an auto-associative neural network
c) a double layer auto-associative neural network d) a neural network that contains feedback

14. What are the advantages of neural networks over conventional computers?

- (i) They have the ability to learn by example (ii) They are more fault tolerant
(iii) They are more suited for real time operation due to their high 'computational' rates
a) (i) and (ii) are true b) (i) and (iii) are true c) Only (i) d) All of the mentioned

15. Why is the XOR problem exceptionally interesting to neural network researchers?

- a) Because it can be expressed in a way that allows you to use a neural network
b) Because it is complex binary operation that cannot be solved using neural networks
c) Because it can be solved by a single layer perceptron
d) Because it is the simplest linearly inseparable problem that exists.

16. Neural Networks are complex _____ with many parameters.

- a) Linear Functions b) Nonlinear Functions c) Discrete Functions d) Exponential Functions