Name : ……………………………………………………….

Roll No. : ……………………………………………………….

Invigilator's Signature : …………………………………….

CS/BCA/SEM-6/BCAE-601B/2012

2012

INTELLIGENT SYSTEMS

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.
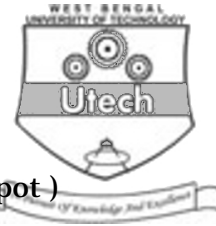
GROUP – A

(Multiple Choice Type Questions)

1.   Choose the correct alternatives for the following :

$$10 \times 1 = 10$$

   i)   Which of the following problems does not occur in heuristic search ?

   a)   Plateau   b)   Ridge

   c)   Local minima   d)   Local maxima.

   ii)   Time complexity of DFS with depth *d* and branch *b* is

   a) $O(bd)$ b) $O(b^d)$

   c) $O(d^b)$ d)   none of these.

   iii)   Which of the following is invalid atom ?

   a)   12345   b)   (*ab*)

   c)   Bill   d)   A1234.

iv) 'Spot is dog' can be represented as

    a)   spot (dog)   b)   dog (spot)

    c)   isdog (spot)   d)   none of these.

v) Local search, such as hill-climbing

    a)   operates using many current states

    b)   is not suitable for pure optimization problem

    c)   uses more memory than DFS

    d)   does not retain the paths followed by search.

vi) In a natural neuron the input signal is received from

    a)   Axon   b)   Nucleus

    c)   Soma   d)   Dendrites.

vii) Theorem proving is an example of

    a)   procedural knowledge

    b)   declarative knowledge

    c)   heuristic

    d)   none of these.

viii) Min-Max role of game proceeds by attempting to

    a)   maximizing the gain of the opponent

    b)   minimizing the gain of self

    c)   maximizing the loss of self

    d)   maximizing the gain of self.

ix) Skolem function is used in

    a)   unification algorithm

    b)   natural deduction

    c)   semantic net

    d)   conversion to clausal form.

x) (car ^{l} (*abc*)) will return

    a)   *a*   b)   *b*

    c)   *c*   d)   *abc*.

GROUP – B

(Short Answer Type Questions)

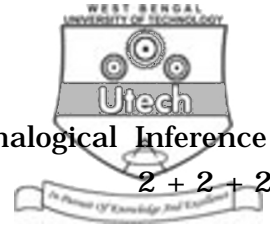Answer any *three* of the following.   3 × 5 = 15

2. a) What is an Expert System ?

    b) What are the characteristic features of an Expert System ?   3 + 2

3. Compare and contrast between BFS and DFS.

4. What is the difference between Knowledge and Intelligence ?

5. What is the difference between Informed Search and Uninformed Search ?

6. Briefly explain AND-OR graph with suitable example.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. a) Represent the following expression in First Order Predicate Logic (FOPL) :   3 × 3

       i) Everyone is loyal to someone.

       ii) No employee earns more than the President.

       iii) All employees earning Rs. 20,000 or more per month pay tax.

    b) Represent the given facts about a professor with the help of a Frame Structure :

       Bob is a Professor, his wife's name is Sandy and he is having two children Sue and Joe.   6

8. a) Explain Abductive, Inductive and Analogical Inference with an example. 2 + 2 + 2

b) What is Clausal Form ? Change the following expression to Clausal Form : 2 + 7

$$\exists x \, \forall_y \, (\, \forall_z \, P \, (\, f \, (\, x \,), \, y, \, z \,) \to (\, \exists \, u \, Q \, (\, x, \, u \,) \, \land \, \exists \, v \, R \, (\, y, v \,) \,) \,)$$

9. a) What is Neural Network ? 5

b) Describe the biological neuron used to model an artificial neuron. 5

c) Describe the Hopfield model. 5

10. a) Describe A^{*} algorithm with example. Why is it admissible and optional ? 3 + 4

b) Describe the approaches of knowledge representation.

4

c) What are the problems that a heuristic search may face ? Explain them. 4

11. Write short notes on any *three* of the following : 3 × 5

a) 8 Puzzle Problem

b) Predicate Logic

c) Hill Climbing

d) Heuristic Search

e) Polymorphism.

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