BIRLA INSTITUTE OF TECHNOLOGY
MESRA – 835215, RANCHI, INDIA

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Name: …………………………………………………. Roll No.: …………………………………………..
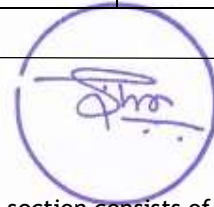
Branch: …………………………………………………. Signature of Invigilator: ……………………

Semester: IVth   Date: 27/04/2022 (MORNING)

Subject with Code: **IT201 BASICS OF INTELLIGENT COMPUTING**

Marks Obtained	Section A (30)	Section B (20)	Total Marks (50)

INSTRUCTION TO CANDIDATE

1. The booklet (question paper cum answer sheet) consists of two sections. First section consists of MCQs of 30 marks. Candidates may mark the correct answer in the space provided / may also write answers in the answer sheet provided. The Second section of question paper consists of subjective questions of 20 marks. The candidates may write the answers for these questions in the answer sheets provided with the question booklet.

2. The booklet will be distributed to the candidates before 05 minutes of the examination. **Candidates should write their roll no. in each page of the booklet.**

3. Place the Student ID card, Registration Slip and No Dues Clearance (if applicable) on your desk. All the entries on the cover page must be filled at the specified space.

4. Carrying or using of mobile phone / any electronic gadgets (except regular scientific calculator)/chits are strictly prohibited inside the examination hall as it comes under the category of unfair means.

5. No candidate should be allowed to enter the examination hall later than 10 minutes after the commencement of examination. Candidates are not allowed to go out of the examination hall/room during the first 30 minutes and last 10 minutes of the examination.

6. Write on both side of the leaf and use pens with same ink.

7. The medium of examination is English. Answer book written in language other than English is liable to be rejected.

8. All attached sheets such as graph papers, drawing sheets etc. should be properly folded to the size of the answer book and tagged with the answer book by the candidate at least 05 minutes before the end of examination.

9. The door of examination hall will be closed 10 minutes before the end of examination. Do not leave the examination hall until the invigilators instruct you to do so.

10. Always maintain the highest level of integrity. Remember you are a BITian.

11. Candidates need to **submit the question paper cum answer sheets before leaving the examination hall**.

CLASS:BTech   SEMESTER :
                                                                             IV

BRANCH: MECH/BIO/PROD/CE/CEP   SESSION :
                                                                             SP22

SUBJECT:IT201 Basics of Intelligent Computing

TIME: 2Hrs   Set-A   FULL
                                                                             MARKS: 50

INSTRUCTIONS:
1. The question paper contains two parts A-30 MCQ questions each of 1 mark and of total 30 marks,and B-5 Subjective Questions with 4 mark each
2. Candidates must attempt all questions maximum of 50 marks.
3. The missing data, if any, may be assumed suitably.
4. **Before attempting the question paper, be sure that you have got the correct question paper.**

Section A

1) If the productivity of the system is equivalent to that of a human, then it's a   [1]

   a) Weak AI.
   b) General AI
   c) Super AI
   d) All of the above.

2)Who is the father of AI?   [1]

   a) John McCarthy
   b) Fisher Ada
   c) Allen Newell
   d) Alan Turning

3) Given f(n)=g(n)+h(n)   [1]
a)if g(n)=0,Best First search
b)if g(n)=0,A* Algorithm
c)The given function is an A* algorithm
d) h(n)=path cost

4) Consider a graph with the following connections- S->A, S->B, A->B, A->C, B->C,A->G, C->G.The heuristic values at each state are S-7,A-6,B-2,C-1 ,G-0.The optimal path and the path cost is given as.   [1]
a)SABCG,9
b)SACG,9
c)SBCG,10
d)SBACG,15

5)"Nobody Likes Everyone ".The predicate logic representation is   [1]
a) $\forall x[\neg [\forall x likes(y,x)]]$
b) $\forall y[\neg [\forall x likes(x,y)]]$
c) $\forall x[\neg [\forall x likes(y,x)]$
d) $\forall y[\neg [\forall x likes(y,x)]]$

6) $\exists x$:cat $(x) \wedge intelligent(x)$
.The statement for this symbolic representation is   [1]

   a) All Cats are intelligent
   b) All intelligent are Cats
   c) Some cats are Intelligent
   d) Some Intelligent are Cats

7) "All teachers are liked by some student".The predicate logic is   [1]

   a) ∀x:{Teacher(x)→ ∃x:student(y)∧likes(y,x)]
   b) ∀x:{Teacher(x)→ ∃y:student(y)Vlikes(y,x)]
   c) ∀x:{Teacher(x)→ ∃y:student(y)∧likes(y,x)]
   d) ∀x:{Teacher(x)→ ∃y:student(y)∧likes(x,y)]

8) Determine proper matches between the typical capabilities of AI system and corresponding computational elements
   Capability {A. Thinking humanly B.Thinking Rationally C. Acting Humanly D. Acting Rationally}
   Computational Element { I. Cognitive Model II. Natual Language Response and Perceptual Recognition   III. Performance Measure IV. Deductive Reasoning} [1]

   a) A-I, B-IV, C-III, D-II
   b) A-I, B-IV, C-II, D-III
   c) A-IV, B-I, C-II, D-III
   d) A-I, B-II, C-IV, D-II

9)Let A and B be fuzzy sets defined on a Universal set X.   [1]
   X = { 5, 10, 20, 25, 30, 40 }
   A = { (10, 0.2), (20, 0.4), (25, 0.7), (30, 0.9), (40, 1) }
   B = { (10, 0.4), (20, 0.1), (25, 0.9), (30, 0.2), (40, 0.6) }
The Union of fuzzy set A and fuzzy set B is:
A. { (10, 0.2), (20, 0.1), (25, 0.9), (30, 0.2), (40,0.6) }
B. { (10, 0.6), (20, 0.5), (25, 1), (30, 1), (40,1) }
C. { (10, 0.4), (20, 0.4), (25, 0.9), (30, 0.9), (40,1) }
D. { (10, 0.6), (20, 0.5), (25, 0.6), (30, 0.1), (40,0.6) }

10)Let the following fuzzy sets: [1]
   A = { (x1, 0.4), (x2, 0.8), (x3, 0.7) }
   B = { (y1, 1), (y2, 0.4)}
   A' = { (x1, 0.6), (x2, 0.9), (x3, 0.3) }
Find the value of the following composition, if R = (A X B)
                      B' = A' o R (x, y)
A. [0.8 0.3]   B. [0.3 0.3]   C. [0.6 0.9 0.3]   D. [0.8 0.4]

11) Let the following fuzzy sets: [1]
   A = { (x1, 0.3), (x2, 0.7), (x3, 1), x4, 0.9 }
   B = { (x1, 0.5), (x2, 0.3), (x3, 0), x4, 0.9 }
The Hamming distance d (A,B) is:

A. 0.5   B. 0.7   C. 1.6   D. 2.9

12) Let fuzzy set Old: [1]
   Old = {(30, 0), (40, 0.5), (50, 0.6), (60, 0.8), (70,0.9), (80,0.9) }
Then the Crisp value of Old using Mean of Maxima (MOM) method is:

 A. 75   B. 80   C. 50   D. 60

13) In the genetic algorithms the chromosomes are represented in Binary numbers. The strength of a chromosome in decimal form,   [1]

x is given by $Sf(x) = \dfrac{\sum (x)}{\sum f(x)}$ where $f(x) = x^2$

The population is given by P where
P = { (01101), (11000), (01000), (10011) }
The strength of fitness of chromosome 10011 is:

A. 30.85 %   B. 49%   C. 89.6%   D. 0%

14) AWS is the biggest cloud provider that uses ……….Hypervisor today   [1]
   1. Xen
   2. Microsoft Hyper-V.
   3. KVM
   4. VMware

15)Given A-SaaS,B-PaaS,C-IaaS,a-MSOffice365 ,b-AWS,c-AWS Elastic Beanstalk. choose the correct matching   [1]
   a. A-b,B-c,C-a
   b. A-a,B-c,C-b
   c.   A-c,B-a,C-d
   d. A-b,B-c,C-a

16) If you want to work in short-term project that require quick, easy and affordable collaboration.then you will prefer to choose   [1]
   a. PaaS
   b. IaaS
   c. SaaS
   d. None

17) Virtualization, Server, Storage and Network leads to   [1]
   a. PaaS
   b. IaaS
   c. SaaS
   d. None

18) Which of the following is not an IoT enabling Technology   [1]
   a. WSN
   b. Embedded Systems
   c. Big Data Analytics
   d. Blockchain

19) Volume,Velocity and Variety are the characteristics of   [1]
   a. Big data
   b. IoT
   c. Cloud Computing
   d. AR-VR

20) A network has inputs [0.8,0.6,0.4] and the weights w=[0.1,0.3,-0.2] with bias b=0.35 with input 1.The output of the neuron for bipolar sigmoidal activation function is   [1]
   a. 0.359
   b. 0.459
   c. 0.159
   d. 0.259

21) The logistic function is defined as follows, $f(x) = 1/(1 + e^{-(wx+b)})$ where w and b are parameters. What would happen if w increases and what would happen if b increases?   [1]
   a. The slope of the logistic function increases, The centre point of the logistic function moves to the left
   b. The slope of the logistic function decreases, The centre point of the logistic function moves to the left
   c. The centre point of the logistic function moves to the left, The slope of the logistic function increases
   d. The centre point of the logistic function moves to the right, The slope of the logistic function decreases

22) Consider the function $f(\theta) = f(x, y, z) = x^2 + y^2 + z^2 - 8$. What is the gradient of this function at at $\theta = \{1, -1, 1\}$. Note that $\theta = [x, y, z]$ is a collection of all the parameters of this function.   [1]
a.[2,-2,2]
b.[-2,2,-2]
c [2,-2,-2]
d [-2,-2,2]

23)Given Fuzzy Sets A=[0/0 + 0.2/1 + 0.7/2 + 0.8/3 + 0.9/4 + 1/5] and B=[0/0 + 0.1/1 + 0.3/2 + 0.2/3 + 0.4/4 + 0.5/5].The bounded sum is   [1]

a) [0/0 + 0.2/1+1.0/2+1.0/3+1.0/4+1.0/5]
b) [0/0 + 0.2/1+1.0/2+1.0/3+1.0/4+1.0/5]
c) [0/0 + 0.3/1+1.0/2+1.0/3+1.0/4+1.0/5]
d) [0/0 + 0.2/1+1.0/2+1.0/3+1.0/4+1.0/5]

24)Most commonly used protocol in IoT applications [1]
a)MQTT
b)COAP
c)AMQP
d)Only COAP and AMQP

25)The strong alpha cut of the fuzzy set A=[0.1/x1,0.5/x2,0.7/x3,0.9/x4,1/x5,0.5/x6] when alpha=0.5 is [1]
a)[x3,x4,x5]
b)[x1,x2,x3,x5]
c)[x2,x3,x4,x5,x6]
d) [x3,x4,x5,x6]

26)A U A'$\neq$ X is called the [1]
a)Law of contradiction
b)Law of excluded middle
c)Law of intersection
d)Law of Union

27) The α-cut of triangular fuzzy number A= (-5,-1,1) when α=0.5 is [1]
a) (3,0)
b) (0,3)
c(-3,0)
d(0,-3)

28) Which of the following statement is incorrect with respect to a fuzzy number? [1]
a)Convex set
b)Piecewise Continuous
c) Normal fuzzy set
d)Sub Normal fuzzy set

29) The threshold for the 4 input AND and OR function is [1]
a) 4,1
b)3,2
c)1,4
d)1,3

30) Mamdani fuzzy implication is [1]
a)Product operation
b)Minimum operation
c)Maximum operation
d)Division operation

Section B

1. If A and B are two fuzzy numbers: [2+2]

    A = [1/2+ 0.6/3 + 0.4/4 + 0.9/5]
    B = [0.6/2 + 0.8/3 + 0.1/4 + 0.5/5]
     Determine A+B and A/B

2. A neuron j receives inputs from four other neurons whose activity levels are 20,-10,4 and 5.The respective synaptic weights of the neurons are 0.8,0.3,-2.0,and -0.7.Calculate the output of neuron j for the following situations. [2+2]
    (i)The neuron is linear.
    (ii).The neuron is represented by the McCulloch-Pitts model.

3. Give a basic work flow of genetic algorithm [4]

4. Suppose we have a universe of integers Y={1,2,3,4,5}, We define the following linguistic terms as a mapping onto Y: [4]
    "small"={1/1+0.8/2+0.6/3+0.4/4+0.2/5}
    'large" ={0.2/1+0.4/2+0.6/3+0.8/4+1/5}
    Find (i) not very small and not very, very large" (ii) "intensely small".

5. [4]
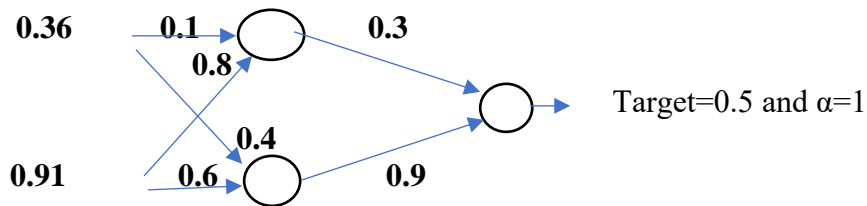
    For the network above determine the Error term at output sigmoid neuron and two hidden sigmoid neurons using backpropagation equations.

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