PRESIDENCY UNIVERSITY
BENGALURU

SET-B

SCHOOL OF ENGINEERING
END TERM EXAMINATION – MAY/ JUNE 2024

Semester : Semester VIII - B.Tech CSE - 2020

Course Code : CSE2044

Course Name : Computational Intelligence

Program : B.Tech-Computer Science and Engineering

Date : MAY 31-2024

Time :9:30 AM-12:30 PM

Max Marks :100

Weightage : 50%

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Note:	1. Answer ALL 5 FULL Questions.
	2. Each Full Question carries 20 Marks
	3. Scientific and non-programmable calculator are permitted.
	4. Do not write any information on the question paper other than Roll Number.

1.a.	State and Prove Modus Ponens. **[Knowledge]**	(CO1)	(04 Marks)
1.b.	Explain expert system with suitable diagram. **[Comprehension]**	(CO1)	(06 Marks)
1.c.	Maximize the function $f(x)=x^3$ where x ranges from 40 to 70 with help of genetic algorithm. **[Application]**	(CO1)	(10 Marks)

or

2.a.	State and Prove Modus Tollens. **[Knowledge]**	(CO1)	(04 Marks)
2.b.	Portray about mini-max algorithm with an example. **[Comprehension]**	(CO1)	(06 Marks)
2.c.	Prove that $(PvQ)^\wedge(\sim P^\wedge R) = QvR$ using truth table. **[Application]**	(CO1)	(10 Marks)

3.a.	Validate using truth table $Pv(P^\wedge Q)=P$. **[Knowledge]**	(CO2)	(04 Marks)
3.b.	Summarize about different types of quantifiers. **[Comprehension]**	(CO2)	(06 Marks)
3.c.	Prove by resolution that "It is a pleasant day today" using the following sentences [**Application**]	(CO2)	(10 Marks)

    i)   If you go swimming you will get wet.
    ii) If it is raining and you are outside, then you will get wet.
    iii) If it is warm and there is no rain, then it is a pleasant day.
    iv) You are not wet.
    v) You are outside.
    vi) It is warm day.

4.a. State reasoning. Name the different types of reasoning. **[Knowledge]** (CO2) (04 Marks)

4.b. Describe about unification algorithm. **[Comprehension]** (CO2) (06 Marks)

4.c. Verify by resolution that "John likes peanuts" using the succeeding sentences. **[Application]** (CO2) (10 Marks)
   i) John likes all kind of food.
   ii) Apple and vegetable are food
   iii) Anything anyone eats and not killed is food.
   iv) Anil eats peanuts and still alive
   v) Harry eats everything that Anil eats.

5.a. State fuzzy inference with example. **[Knowledge]** (CO3) (04 Marks)

5.b. Clarify how temporal reasoning is useful to make decision in uncertainty? Elaborate. **[Comprehension]** (CO3) (06 Marks)

5.c. Suppose $\mu A(x) = \{(x1, 0.1), (x2, 0.2), (x3, 0.3), (x4, 0.4), (x5, 0.5)\}$ and $\mu B(x) = \{(x1, 0.5), (x2, 0.4), (x3, 0.3), (x4, 0.2), (x5, 0.1)\}$ then prove that (CO3) (10 Marks)
   i) $\mu^\sim(^\sim Bv^\sim A)(x) = \mu(B^\wedge A)(x)$
   ii) $\mu^\sim(^\sim A)(x) = A. \cup.$ **[Application]**

6.a. Name the different types of temporal reasoning. **[Knowledge]** (CO3) (04 Marks)

6.b. Explain the different types of neural network. **[Comprehension]** (CO3) (06 Marks)

6.c. Suppose $\mu A(x) = \{(x1, 0.42), (x2, 0.61), (x3, 0.73), (x4, 0.25), (x5, 0.56)\}$, $\mu B(x) = \{(x1, 0.61), (x2, 0.87), (x3, 0.55), (x4, 0.35), (x5, 0.40)\}$ and $\mu C(x) = \{(x1, 0.21), (x2, 0.82), (x3, 0.43), (x4, 0.14), (x5, 0.95)\}$ then prove that $\mu(A^\wedge B)vC(x) = \mu(AvC)^\wedge(BvC)(x)$. **[Application]** (CO3) (10 Marks)

7.a Find the probability of at least one head when three coins are tossed simultaneously. **[Knowledge]** (CO4) (04 Marks)

7.b. Three persons A, B, C have applied for a job in a private company. The chance of their selections is in the ratio 1:2:4. The probabilities that A, B, C can introduce changes to improve the profits of the company are 0.8, 0.5, and 0.3 respectively. if the changes do not take place, find the probability that it is due to the appointment of C. **[Comprehension]** (CO4) (06 Marks)

7.c Let us consider the two-dimensional space contains eight different points (4,1), (4, -1), (8,2), (8, -2), (-4,1), (-6,3), (-8,2), (-8, -2). The first four points are labelled as positive points and the next four points are labelled as negative points. Apply support vector machine to find the bias between two categories of labels. **[Application]** (CO4) (10 Marks)

Or

8.a Tell the equation and formula of single linear regression model. **[Knowledge]** **(CO4)** **(04 Marks)**

8.b. Suppose a neural network having two layers namely input and output. The input layer contains one input node and one bias node. The output layer holds one output unit. It also contains two weights. Build a neural network model to compute not logic. **[Comprehension]** **(CO4)** **(06 Marks)**

8.c Let us consider a table which have features Age, Income, Student, Credit Rating and one classifier Buys Computer. Apply decision tree model to build a decision tree. **[Application]** **(CO4)** **(10 Marks)**

Age	Income	Student	Credit Rating	Buys Computer
Less than 30	High	No	Fair	No
Less than 30	High	No	Excellent	No
Between31 to 40	High	No	Fair	Yes
Greater than 40	Medium	No	Fair	Yes
Greater than 40	Low	Yes	Fair	Yes
Greater than 40	Low	Yes	Excellent	No
Between31 to 40	Low	Yes	Excellent	Yes
Less than 30	Medium	No	Fair	No
Less than 30	Low	Yes	Fair	Yes

9.a Describe about neuro-fuzzy inference. **[Knowledge]** **(CO3)** **(04 Marks)**

9.b Discuss about fuzzy rules in fuzzy logic. **[Comprehension]** **(CO3)** **(06 Marks)**

9.c Suppose $\mu A(x)$ = {(x1, 0.22), (x2, 0.51), (x3, 0.43), (x4, 0.25), (x5, 0.76)}, $\mu B(x)$ = {(x1, 0.65), (x2,0.82), (x3, 0.55), (x4, 0.35), (x5, 0.42)} then Validate that **(CO3)** **(10 Marks)**

    i) $\mu(A \wedge B) \vee B(x) = \mu B(x)$

    ii) $\mu(A \wedge B) (x) = \mu(B \wedge A) (x)$ **[Application]**

Or

10.a Discuss forms of learning. **[Knowledge]** **(CO4)** **(04 Marks)**

10.b State and prove Bayes theorem. **[Comprehension]** **(CO4)** **(06 Marks)**

10.c Suppose a neural network having two layers namely input and output. The input layer contains two input nodes and one bias node. The output layer holds one output unit. It also contains three weights. Build a neural network model to compute and logic **[Application]** **(CO4)** **(10 Marks)**