

Time: 3 Hours

Max. Marks: 80

## INSTRUCTIONS:

- (1) Question 1 is compulsory.
- (2) Attempt any **three** from the remaining questions.
- (3) Draw neat diagrams wherever necessary.

Q.1

5 marks each

- (a) From above given probability distribution find
- $P(\text{Cavity} | \text{Toothache})$

	Toothache		¬ Toothache	
	Catch	¬ Catch	Catch	¬ Catch
Cavity	0.108	0.012	0.072	0.008
¬ Cavity	0.016	0.064	0.144	0.576

- (b) Explain the Centroid method of Defuzzification with a suitable diagram?
- (c) Describe Deep Learning concept with an example.
- (d) Describe in detail Holdout method and Random subsampling?

Q.2

10 marks each

- (a) How to improve the classification accuracy of class-Imbalanced data. Explain with suitable examples.
- (b) Define Cognitive Computing. Draw a neat diagram of elements of the cognitive system and explain the elements

Q.3

10 marks each

- (a) Explain the components of CNN architecture.
- (b) What is Multi modal application? Explain the Data Science for Multi modal applications.

Q.4

10 marks each

- (a) Consider two fuzzy sets.

$$\underline{A} = \left\{ \frac{0.2}{1} + \frac{0.3}{2} + \frac{0.4}{3} + \frac{0.5}{4} \right\}$$

$$\underline{B} = \left\{ \frac{0.1}{1} + \frac{0.2}{2} + \frac{0.2}{3} + \frac{0.1}{4} \right\}$$

Find the algebraic sum, algebraic product, bounded sum, and bounded difference of the given fuzzy sets and also describe properties of fuzzy sets.

- (b) Illustrate inferencing in Bayesian Belief Network with an example.

Q.5

10 marks each

- (a) List steps in building a typical cognitive application. Explain the same for Healthcare application.
- (b) Illustrate the autoencoder with architecture diagram.

Q.6

10 marks each

- (a) Calculate Accuracy, Precision, Recall, Sensitivity and Specificity for the following example.

Actual Class \ Predicted Class	Cancer=yes	Cancer=no
Cancer=yes	90	210
Cancer=no	140	9560

- (b) Write a short note on- Trends in Data Science.