WALCHAND COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Vishrambag, Sangli – 416415

Second Year B.Tech. Computer Science and Engineering
ESE , EVEN SEMESTER, AY 2023-24
Applied Mathematics for Computer Science and Engineering (6CS225) | **ESE**

PRN: _____

Day & Date: Friday, 10/05/2024 Time : 3.00 pm to 5.00 pm

Max Marks: **50**

IMP: Verify that you have received question papers with correct course code, branch etc.

Instructions
a) All questions are compulsory.
b) Writing question number on answer book is compulsory otherwise answers may not be assessed.
c) Assume suitable data wherever necessary.
d) Figures to the right of question text indicate full marks.
e) Mobile phones, smart gadgets and programmable calculators are strictly prohibited.
f) Except PRN anything else writing on question paper is not allowed.
g) Exchange/Sharing of stationery, calculator etc. not allowed.
h) **Part A and Part B answers should be written on separate answer sheets.**

Text on the right of marks indicates course outcomes (Only for faculty use) Marks

PART A

Q1 A) If A and B are two fuzzy sets defined on some finite set X then prove that CO1

$$|A| + |B| = |A \cup B| + |A \cap B|$$ 5

B) Obtain an orthonormal basis with respect to standard inner product for the subspace of R^3 generated by (1, 0, 3) and (2, 1, 1) CO1 5

C) Find the basis for the subspace of R^4 spanned by row vectors $(1, 1, -4, -3), (2, 0, 2, -2), (2, -1, 3, 2)$ CO1 5

PART B

Q2 A) Consider a dataset of students' exam scores in two subjects: Math and English. Here are the scores: CO2

Student	Math score	English score
1	70	80
2	65	75
3	80	85
4	55	70
5	75	90

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Using Min-Max normalization identify normalized score of every student in Math and English subject.

B) Consider the prices of different smartphones in dollar as given below

Prices: 300, 350, 400, 450, 500, 550, 600, 650, 700, 750.

Identify Q1, Q2, Q3, min, max and draw a Box and Whisker plot for above data. 4

Q3 A) Suppose you conducted a survey on the ages of participants in a marathon race. You grouped the ages into intervals and recorded the frequency of participants falling within each interval. Here's a table showing the class intervals and frequencies:

Age interval	Frequency
16-25	10
26-35	20
36-45	15
46-55	12
56-65	8
66-75	5

Calculate Mean, Median and Mode of above dataset. 6

B) Consider the following system of congruences:

$$x \equiv 2 (\text{mod } 3)$$

$$x \equiv 3 (\text{mod } 4)$$

$$x \equiv 2 (\text{mod } 5)$$

Using Chinese remainder theorem identify value of 'x' 5

Q4 A) Using Miller-Rabin test, prove that 561 is not a prime number. 4

B) Using Fermat's factorization technique identify the prime factors of number $n = 809009$ 3

5 **A)** A disease classification model is tested in a hospital for 200 patients, the total predicted positive instances found were 140. While actual positive instances were recorded as 160. If the True Positive Rate of model is 0.75, then calculate the accuracy and precision of model. CO1 **4**

B) For a points given below, CO2

X1= (1,3,7)

X2= (4,7,3) **4**

Identify Euclidian, Manhattan and Minkowski distance with order 3 between these two points.

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