IT

WALCHAND COLLEGE OF ENGINEERING
(Government Aided Autonomous Institute)
Visharambag, Sangli – 416415
Second Year B.Tech. Computer Science and Engineering
Re-Exam, Odd and Even Semester AY 2022-23
Applied Mathematics for Computer Science and Engineering (6CS225) **Re-Exam**

PRN: _____

Day & Date: Monday, 11/09/2023 Time: 02.00 pm to 05.00 pm

Max Marks: **100**

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.

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

PART A

			Marks	
Q1	A)	Define (a) Inner product space (b) Norm of vector	5	CO1
	B)	Define (a) Orthogonal set (b) Orthonormal set	5	CO1
	C)	If S is orthogonal set of non-zero vectors in an inner product space V, then show that S is linearly independent set.	5	CO1
Q2	A)	Show that $S = \{(1,1,1),(1,1,0),(1,0,0)\}$ is basis for R^3	5	CO1
	B)	Write the standard basis for the vector space (a) R^3 (b) Polynomial of degree less than or equal to n	2	CO1
	C)	Define Dimension of vector space.	2	CO1
	D)	Let $V = R^+$ be the set of all positive reals. Define addition of any two members x *and* y to be usual multiplication of numbers i.e $x + y = x.y$ Define scalar multiplication by scalar k to any $x \in R^+$ to be x^k i.e $kx = x^k$ then show that V is vector space.	9	CO1
Q3	A)	Define Level set with example	4	CO1
	B)	Define alpha cut set and strong alpha cut set	5	CO1
	C)	Define Height of Fuzzy set	2	CO1
	D)	Find alpha cut and strong alpha cut set for fuzzy set B whose membership value is defined as $B(x) = [1 + (x-10)^2]^{-1}, \quad \alpha = 0.3,\ 0.8,\ 0.5$	6	CO2

PART B

Q4 A) Consider below confusion matrix for a newly created image classification model

		Predicted	
		Yes	No
Actual	Yes	250	125
	No	40	65

Calculate

a. Accuracy
b. True Positive Rate
c. Precision
d. Specificity
e. F1 score

B) What is Primality test? Using Fermat's little theorem prove that 103 is a prime number. (Use K= 3) 5

C) Find out the factors of below equations. 5

a. $9 + 3xy + x^2y + 3x$
b. $x^2 + 8x + 15$
c. $16x^2 - 49y^2$
d. $5x^2 + xy - 6x$
e. $x^2 - 7x + 12$

Q5 A) Find the GCD of 270 and 192 using Euclidian algorithm. 5

B) Calculate primitive roots of 7. 5

C) Perform Min-Max Normalization on the following - 5

$V_i = 73600 \quad Max_A = 78000 \quad Min_A = 11000$

D) Find Mean, Mode, Median for following –

i. **Mean**

No. of bulbs	No. of boxes
0 - 4	1
4 - 8	3
8 - 12	6
12 - 16	4
16 - 20	2

ii. **Mode**

Marks	Frequency
0 - 20	2
20 - 40	7
40 - 60	9
60 - 80	8
80 - 100	3

iii. **Median**

Class Interval	Frequency
0 - 15	2
15 - 30	4
30 - 45	7
45 - 60	9
60 - 75	12
75 - 90	14

E)

06 A) Find Percentile & Quantile for 13 - CO3

1,4,5,7,13,14,15,20,23,16 4

B) Elaborate *Loss Function* with block diagram. 5 CO3

C) Derive the term Intersection Over Union with prior example. 5 CO3