

(FOR THE CANDIDATES ADMITTED  
DURING THE ACADEMIC YEAR 2022 ONLY)

22UCS1A1

REG.NO

NGM COLLEGE (AUTONOMOUS) POLLACHI

END-OF-SEMESTER EXAMINATIONS: DECEMBER- 2022

B. Sc - Computer Science (Aided & SF)

MAXIMUM MARKS: 50

I SEMESTER

TIME: 3 HOURS

PART - III

ALLIED I – MATHEMATICS  
(STATISTICAL METHODS & LINEAR ALGEBRA)

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

(K1)

- Find out the median of the following items 10, 15, 9, 25, 19 \_\_\_\_\_  
a) 10                                      b) 15                                      c) 25                                      d) 19
- Mention the formula to find standard error \_\_\_\_\_  
a)  $\sqrt{pq}$                                       b) npq                                      c)  $\sqrt{npq}$                                       d)  $\sqrt{np}$
- How many ways 7 students form a ring?  
a) 7!                                      b) 8!                                      c) 5!                                      d) 6!
- Matrix times vector Ax is a combination of the \_\_\_\_\_ of A.  
a) row                                      b) column                                      c) diagonal                                      d) all the above
- The determinant of the n by n identity matrix is \_\_\_\_\_.  
a) 0                                      b) -1                                      c) 1                                      d) none

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

- Find the range of the following 27, 30, 35, 36, 38, 40, 43?
- When is the sample said to be small samples?
- What is the probability of getting an even number, when a die tossed?
- Define inner product.
- Give any one example for not diagonalizable.

SECTION – B

(5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(Qn. No. 11 to 15 Questions for Short Answers with internal choices)

(K3)

- a) Calculate the mode from the following series:

Size of item	Frequency
0 – 5	20
5 – 10	24
10 – 15	32
15 – 20	28
20 – 25	20
25 – 30	16
30 – 35	34
35 – 40	10
40 - 45	8

(CONTD....2)

(OR)

b) Calculate standard deviation from the following

Marks	No. of. Students
10	8
20	12
30	20
40	10
50	7
60	3

12. a) A college conducted both day and evening classes intended to be identical.

A sample of 100 day students yields examination results as under :

$$\bar{X}_1 = 72.4 \quad \sigma_1 = 14.8$$

A sample of 200 evening students yields examination results as under :

$$\bar{X}_2 = 73.9 \quad \sigma_2 = 17.9$$

Are the two means statistically equal at 1% level?

(OR)

b) The following results are obtained from a sample of 10 boxes of biscuits.

Mean weight of contents = 490 gms.

Standard deviation of the weight = 9 gms.

Could the sample come from a population having a mean of 500 gms.

13. a) Two cards are drawn from a pack of 52 cards at random. What is the probability that it will be? (i) a diamond and a heart (ii) a king and a queen (iii) two kings

(OR)

b) Define Sample Space with example.

14. a) The linear combinations of  $v = (1, 1, 0)$  and  $\omega = (0, 1, 1)$  fill a plane. Describe that plane. Find a vector that is not combination of  $v$  and  $\omega$ .

(OR)

b) Let the blocks of A be its n columns. Let the blocks of B be its n rows. Then find the block multiplication AB adds up columns times rows.

15. a) Find the columns of  $A^{-1}$  by solving  $AA^{-1} = I$  by using Cramer's Rule for  $n = 2$ .

(OR)

b) Solve  $du/dt = Au$  by knowing the eigenvalues  $\lambda = 1, 2, 3$  of A :

$$\frac{du}{dt} = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ 0 & 0 & 3 \end{bmatrix} u \text{ starting from } u(0) = \begin{bmatrix} 9 \\ 7 \\ 4 \end{bmatrix}$$

## SECTION – C

(5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K4 (Or) K5)

16. a) Find Karl Pearson's coefficient of correlation from the following data :

Wages	100	101	102	102	100	99	97	98	96	95
Cost of living	98	99	99	97	95	92	95	94	90	91

(OR)

b) Calculate the two regression equations of X on Y and Y on X from the data given below, taking deviations from actual means of X and Y

Price (Rs.)	10	12	13	12	16	15
Amount Demanded	40	38	43	45	37	43

Estimate the likely demand when the price is Rs. 20

(CONTD....3)

17. a) Calculate standard error of mean from the following data, showing the amount paid by 100 firms in Calcutta on the occasion of Durga puja.

Mid Value (Rs.)	39	49	59	69	79	89	99
No. of firms	2	3	11	20	32	25	7

(OR)

- b) The heights of six randomly chosen soldiers are in inches : 76, 70, 68, 69, 69 and 68. Those of 6 randomly chosen sailors are 68, 64, 65, 69, 72, 64. Discuss in the light of these data throw on the suggestions that soldiers are, on the average, taller than soldiers. Use t – test.
18. a) Two dice are thrown. Find the probability that :
- the total of the numbers on the dice is 8,
  - the first dice shows 6,
  - the total of the numbers on the dice is greater than 8,
  - the total the number on the dice is 13,
  - both the dice show the same number,
  - the sum of the numbers shown by the dice is less than 5,
  - the sum of the numbers shown by the dice is exactly 6.

(OR)

- b) Box I contains three defective and seven non – defective balls, and Box II contains one defective and nine non – defective balls. We select a box at random and then draw one ball at random from the box.
- What is the probability of drawing a non – defective ball ?
  - What is the probability of drawing a defective ball ?
  - What is the probability that box I was chosen, given a defective ball is drawn ?
19. a) For the vectors  $v = (3, 4)$  and  $\omega = (4, 3)$  test the Schwarz inequality on  $v \cdot \omega$  and the triangle inequality on  $\|v + \omega\|$ . Find  $\cos \theta$  for the angle between  $v$  and  $\omega$ . When will we have equality  $|v \cdot \omega| = \|v\| \| \omega \|$  and  $\|v + \omega\| = \|v\| \| \omega \|$ ?

(OR)

- b) Find  $A^{-1}$  by using Gauss-Jordan elimination starting from  $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$ .
20. a) Prove that if A is singular then  $\det A = 0$  and if A is invertible then  $\det A \neq 0$ .

(OR)

- b) Find the eigen values and eigen vectors of A and  $A^2$  and  $A^{-1}$  and  $A + 4I$  :

$$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix} \text{ and } A^2 = \begin{bmatrix} 5 & -4 \\ -4 & 5 \end{bmatrix}$$

A-11

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