STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted from the academic year 2019-2020 & thereafter)

SUBJECT CODE : 19MT/AC/MS45

B. C. A. DEGREE EXAMINATION, APRIL 2022
FOURTH SEMESTER

COURSE : ALLIED CORE
PAPER : MATHEMATICS FOR COMPUTER SCIENCE-II
TIME : 3 HOURS **MAX. MARKS : 100**

SECTION – A

ANSWER ANY TEN QUESTIONS: **(10×2=20)**

1. Check the validity of the statement "The mean of a binomial distribution is 15 and its standard deviation is 5".
2. An aptitude test for selecting officers in a bank was conducted on 1,000 candidates, the average score is 42 and the standard deviation of score is 24. Assuming normal distribution for the scores, find the number of candidates whose score exceed 60.
3. Explain the two hypotheses in a statistical test.
4. Define Type I and Type II error.
5. Define a Chi-square test.
6. What is degrees of freedom?
7. State two conditions for applying Chi-square test.
8. What are the types of correlation?
9. Draw the scatter diagram for high degree of positive correlation and no correlation.
10. State any two difference between correlation and regression analysis.
11. Define the variance ratio test.
12. List out the assumptions in F-Test.

SECTION – B

ANSWER ANY FIVE QUESTIONS: **(5×8=40)**

13. A sample of 3 items is selected at random from a box containing 12 items of which 3 are defective. Find the possible number of defective combinations of the same 3 selected items along with probability of a defective combination.

14. Fit a Poisson distribution to the following data and calculate theoretical frequencies:

Deaths	0	1	2	3	4
Frequency	122	60	15	2	1

15. A machine produced 20 defective articles in a batch of 400. After overhauling, it produced 10 defectives in a batch of 300. Has the machine improved?

16. Weights in kg. of 10 students are $38, 40, 45, 53, 47, 43, 55, 48, 52, 49$. Can we say that variance of the distribution of weights of all students from which the above sample of 20 students was drawn is equal to 20 square kg.? You are given the following table values:

Degrees of freedom	$\chi^2_{0.05}$	$\chi^2_{0.01}$
9	16.92	21.67
10	18.31	23.21

17. Find Karl Pearson's coefficient of correlation from the following data.

Price	14	16	17	18	19	20	21	22	23
Demand	84	78	70	75	66	67	62	58	60

18. From the following data obtain the regression equation Y on X and estimate the value of Y which should correspond on an average to $X = 6.2$.

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

19. Two samples are drawn from two normal populations. From the following data, test whether the two samples have the same variance at 5% level:

Sample 1	60	66	71	74	76	82	85	87		
Sample 2	61	66	67	85	78	63	85	86	88	91

SECTION – C

ANSWER ANY TWO QUESTIONS: (2×20=40)

20. a) The income of a group of 10,000 persons were found to be normally distributed with mean equal to Rs. 750 P.M. and standard deviation equal to Rs. 50. Show that of this group about 95% had income exceeding Rs. 668 and only 5% had income exceeding Rs. 832. What was the lowest income among the richest 100?

b) Ten students are selected at random from a college and their heights are found to be $100, 104, 108, 110, 118, 120, 122, 124, 126$ and 128 cms. In the light of these data, discuss the suggestions that the mean heights of the students of the college is 100 cms. Use 5% level of significance. $(10 + 10)$

21. a) An automobile company gives you the following information about age groups and the liking for particular model of car which it plans to introduce.

	Age Groups				
	Below 20	$20-39$	$40-59$	60 & above	Total
Persons who:					
Liked the car	140	80	40	20	280
Disliked the car	60	50	30	80	220
Total	200	130	70	100	500

On the basis of this data can it be conducted that the model appeal is independent of the age group. [Given for $\nu = 3$, $\chi^2_{0.05} = 7.815$.]

b) Given that the variance of $x = 9$ and the regression lines are $8X - 10Y + 66 = 0$, $40X - 18Y = 214$, find the mean values of X and Y, the coefficient of correlation between X and Y. Find also the Standard deviation of Y. $(10 + 10)$

22. a) The following table gives the frequency, according to groups, of marks obtained by 67 students in an intelligence test. Measure the degree of relationship between age and intelligence test.

	Age in years			
	18	19	20	21
Test Marks				
$200-250$	4	4	2	1
$250-300$	3	5	4	2
$300-350$	2	6	8	5
$350-400$	1	4	6	10

b) The following figures relate to production in kg. of three varieties A, B, C of wheat sown in 12 plots:

A	14	16	18		
B	14	13	15	22	
C	18	16	19	19	20

Is there a significant difference in the production of three varieties? (12+8)