



III Semester M.C.A. Examination, April/May 2022
(CBCS)
COMPUTER SCIENCE
MCA 304 : Statistical Analysis

Time : 3 Hours

Max. Marks : 70

- Instructions :** 1) Answer **all** Sections.
2) Answer **any five** questions from Section – A and answer **any four** questions from Section – B.

SECTION – A

Answer **any 5** questions. Each question carries **6** marks : (5×6=30)

1. a) State and prove addition theorem of probability. 3
b) Two fair dice are rolled at once. Find the probability that the sum of the numbers obtained is 7 or 10. 3

2. Find the unknown 'K' in the following probability distribution and also find $E(X)$, $Var(X)$ and $SD(X)$. 6

X	0	1	2	3	4
Y	3/8	1/4	K	3/16	1/16

3. State and prove Baye's theorem. 6
4. Calculate the coefficient of correlation between x and y for the following data : 6

x	21	22	23	24	25	26	27	28	29	30
y	11	12	13	14	15	16	17	18	19	20

5. Derive mean and variance of Poisson's distribution. 6
6. Fit an equation of the form $y = ax^b$ to the following data : 6

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5



7. The probabilities that a patient recovers from COVID-19 is 0.8. If 10 people are known to have contacted COVID-19, what is the probability that
- 7 of them recover
 - At least 9 of them recover.
- 6
8. From the following series of annual data, find the trend line by the method of semi-averages by plotting the trend line, also estimate the value of 2006.
- 6

Year	2000	2001	2002	2003	2004	2005
Annual values	170	231	261	267	278	302

SECTION – B

Answer any 4 questions. Each question carries 10 marks : (4×10=40)

9. The joint probability distribution of X and Y are given below : 10

Y \ X	1	2	3
1	0.186	0.148	0.074
2	0.037	0.111	0.111
3	0.111	0.148	0.074

Find :

- Marginal probability distribution of X and Y
 - $E(X)$ and $E(Y)$
 - $V(X)$ and $V(Y)$
 - Conditional distribution of Y given $X = 1$
 - Conditional distribution of X when $Y < 2$.
10. a) Three machines M_1 , M_2 and M_3 manufactures respectively 40%, 50% and 10% of total production. The percentage of defective items produced by M_1 , M_2 , M_3 are 2%, 4% and 5% respectively. If an item is chosen at random and is found to be defective. Find the probability that it is being a product of M_3 . 6
- b) Define simple random sampling and stratified random sampling with example. 4
11. Given the bivariate data : 10

x	1	5	3	2	1	1	7	3
y	6	1	0	0	1	2	1	5

- Fit the two regression lines (x on y and y on x)
- Predict x if $y = 2.5$
- Compute the correlation coefficient.



12. a) Calculate the coefficient of rank correlation from the following data : 5

x	50	81	75	88	95	90	60	80
y	100	142	120	134	150	115	110	140

- b) The following are the values of production (in thousand meters) of a cloth mill. 5

Year	2002	2004	2006	2008	2010	2012	2014
Production	75	79	86	92	92	94	96

- i) Fit a straight line trend ($y = a + bx$) using least square method.
ii) Estimate the production in the year 2016.
13. a) In order to test whether the attributes, COVID-19 infection and gender are independent, a survey of 80 people was conducted and the results are as given below. Conduct chi-square test for independence of attributes at 5% level of significance. 5

	COVID -Ve	COVID +Ve
Male	20	30
Female	8	19

- b) The orange fruits grown in a large orchard have a mean weight of 19.3 ounces with a S.D. of 2.2 ounces. Assuming that the distribution of the weight of these orange fruits has the shape of normal distribution, find
- i) what percentage of the orange fruits weigh less than 18 ounces.
ii) what percentage of the orange fruits weigh atleast 20 ounces. 5

14. A random sample of 5 truck tyres is taken from each of 3 brands manufactured by 3 companies. The life time of these tyres are given below. Use analysis of variance technique to determine whether the average life time of 3 brands of tyres are equal or not. Test ' α ' at 5%. 10

Brand 1	35	34	34	33	34
Brand 2	32	32	31	28	29
Brand 3	34	33	32	32	33