



III Semester M.C.A. Examination, January 2017
(CBCS Scheme)
COMPUTER SCIENCE
MCA 304 : Statistical Analysis

Time : 3 Hours

Max. Marks : 70

Instruction : Answer **any five** questions from Part – A and **any four** questions from Part – B.

PART – A

Answer **any five** questions :

(5×6=30)

1. a) Define Sample Space, Mutually Exclusive Events and Independent Events. **3**
b) State axiomatic approach to probability. **3**
2. A random variable X has the following probability distribution :

X :	1	2	3	4
P(x) :	5k	4k	3k ²	7k ²

Find the value of k, mean and variance.
3. a) State and prove Baye's theorem. **4**
b) If $f(x) = \begin{cases} (x+1)/2, & -1 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$
represents the probability density function of random variable X, find E(X). **2**
4. a) The following are the marks of 8 students in Maths and Statistics. Find the coefficient of rank correlation. **4**

Marks in Maths :	25	43	27	35	54	61	37	45
Marks in Stats. :	35	47	20	37	63	54	28	40

b) In a bivariate data, the regression lines are $2X - Y + 4 = 0$ and $X - Y + 1 = 0$.
Find correlation coefficient. **2**

P.T.O.



5. 12% of the items produced by a machine are defective. What is the probability that out a random sample of 5 items produced by the machine ?
- All are defectives
 - At least one is defective
 - At most two are defectives.
6. A potential buyer of electric bulbs bought 50 bulbs of brand A and B. Upon testing these bulbs, it was found that brand A had a mean life of 1282 hours with a standard deviation of 80 hours, whereas brand B had a mean life of 1208 hours with a standard deviation of 94 hours. Can the buyer be reasonably certain that the two brands do not significantly differ in quality ?
7. Fit an equation of the type $Y = ab^x$ to the following data :
- | | | | | | |
|-----|-----|-----|------|------|-----|
| X : | 1 | 2 | 3 | 4 | 5 |
| Y : | 1.6 | 4.5 | 13.8 | 40.2 | 125 |
8. Find the trend for the following time series using three-yearly moving average method :
- | | | | | | | | | |
|---------|------|------|------|------|------|------|------|------|
| Year : | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Value : | 2 | 4 | 5 | 7 | 8 | 10 | 13 | 15 |

PART – B

Answer any four questions :

(4×10=40)

9. The joint probability distribution of X and Y is given in the following table :

X/Y	1	2	3
1	$\frac{5}{27}$	$\frac{4}{27}$	$\frac{2}{27}$
2	$\frac{1}{27}$	$\frac{3}{27}$	$\frac{3}{27}$
3	$\frac{3}{27}$	$\frac{4}{27}$	$\frac{2}{27}$

Find :

- Marginal probability distributions of X and Y
- $E(X)$, $E(Y)$
- $V(X)$, $V(Y)$
- Conditional distribution of Y given $X = 1$.



10. The following table gives the duration of the training and the completion time (in hours) of a job in a computer :

Duration of the training :	10	15	20	22	25	27	30
Completion time :	13	12	15	10	8	11	9

Calculate Pearson's coefficient of correlation and two regression lines. Also estimate the expected completion time if the duration of the training is 28 hours.

11. a) Three machines A, B, C manufacture respectively 35%, 45% and 20% of the total production. The percentage of items produced by A, B and C are 2, 4 and 3 respectively are defective. If an item is chosen at random and is found defective. What is the probability of it being a product of B ? 5
- b) In a random sample of 500 families owning Television sets in the city of Bengaluru it is found that 300 families have purchased DTH equipment. Find 95% and 99% C.I. for the actual proportion of families in this city who purchased DTH. 5
12. a) Derive mean and variance of Poisson distribution. 5
- b) The average monthly sales of 2000 firms are normally distributed with mean ₹ 26,000 and standard deviation of ₹ 6,000. Find :
- The number of firms for which the sales exceed ₹ 32,000.
 - The numbers of firms with sales between ₹ 28,000 and ₹ 32,000. 5
13. a) Fit a straight line trend to the following data by the method of least squares :
- | | | | | | | |
|---------------------------------|------|------|------|------|------|------|
| Year : | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Production ('000 tons) : | 83 | 92 | 74 | 90 | 106 | 115 |
- Estimate the production for the year 2016 and 2017. 5
- b) A group of 350 adults who participated in a health survey were asked whether they were on diet. The responses by sex are as follows :
- | | Male | Female |
|--------------------|------|--------|
| On diet | 14 | 25 |
| Not on diet | 159 | 152 |
- Do these data support that being on diet is independent on sex ? 5



14. The following data gives the no. of units of production per day turned out by four different types of machines :

Employee	Type of Machine			
	M1	M2	M3	M4
E1	40	36	45	30
E2	38	42	50	41
E3	36	30	48	35
E4	46	47	52	44

Test the hypothesis that mean production is same for the 4 machines and employees do not differ with respect to mean productivity.
