III Semester M.C.A. Examination, January 2016
(CBCS)
COMPUTER SCIENCE
MCA -- 304 : Statistical Analysis

Time : 3 Hours   Max. Marks : 70

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

PART – A

Answer **any five** questions :   (5×6=30)

1. a) Two cards are drawn at once from a deck of playing cards, find the probability
      that :   3

      i) 1 is club and other is heart   ii) both belongs to same colour.

   b) If A and B are independent then prove that $\bar{A}$ and $\bar{B}$ are also independent.   3

2. A random variable X has the following probability distribution :

Value of x :	0	1	2	3	4	5	6	7
P (x) :	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2 + K$

   Find K, Mean and variance of the distribution.

3. a) State and prove Baye's theorem.   4

   b) Find a constant 'C' such that   2

   $$f(x) = \begin{cases} Cx^2 & 0 < x < 3 \\ 0 & \text{otherwise} \end{cases} \text{ is a P.df}$$

4. a) For the following data calculate the coefficient of correlation between the
      variables x and y   4

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

   b) In a bivariate data on x and y, Var(x) = 49, Var (y) = 9, Cov (x, y) = – 17.5.
      Find the coefficient of correlation between x and y.   2

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5. A container has 100 electric lamps, 20 of which are defective and 10 are selected at random, find the probability that :

    i) all are defective   ii) Atleast one is defective

    iii) all are good   iv) atmost 3 are defective

6. The mean height of 50 female students who showed above average participation in Annual sports was 68.2 inches with a standard deviation of 2.5 inches; while 50 female students who showed no interest in such participation had a mean height of 67.5 inches. With a standard deviation of 2.8 inches. Test the hypothesis that the female students who participated in annual sports are taller than other female students.

7. Fit an equation of the form $y = ab^x$ to the following data :

x	2	3	4	5	6
y	144	172.8	207.4	248.8	298.6

8. Apply the method of semi-averages for determining trend of the following data and estimate the value for 2000.

Years	1993	1994	1995	1996	1997	1998
Sales (thousand units)	20	24	22	30	28	32

PART – B

Answer **any four** questions :   (4×10=40)

9. For the following bivariate probability distribution of X and Y. Find :

    i) Marginal density of X and Y   ii) $P(X \le 1)$

    iii) $P(X \le 1, Y = 2)$ iv) $P(Y = 3)$

    v) $P(Y \le 3)$ and   vi) $P(X < 3, Y < 4)$

X \ Y	1	2	3	4	5	6
0	0	0	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{3}{32}$
1	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
2	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{1}{64}$	$\frac{1}{64}$	0	$\frac{2}{64}$

10. a) Calculate the rank correlation of the marks obtained by 10 students in the subjects. 4

| History | 42 | 68 | 92 | 48 | 81 | 52 | 39 | 78 | 22 | 11 |
| Economics | 32 | 52 | 82 | 62 | 72 | 42 | 22 | 92 | 02 | 12 |

b) The following data gives the height (x cms) and weight (y kgs) of 6 employees. Obtain the two regression equations. Also, find the expected height of an employee whose weight is 60 kgs. 6

| x (cms) | 153 | 157 | 168 | 160 | 170 | 163 |
| y (kgs) | 48 | 50 | 50 | 49 | 54 | 53 |

11. a) M1, M2 and M3 are the three machines which produce respectively 60%, 30% and 10% of the total production of the factory. The percentage of defective output of these machines are respectively 2%, 3%, and 4%. An item is selected at random and is found to be defective. Find the probability that the items were produced by machine M3. 5

b) An engineering college has 4 branches, computer science, civil, electrical and mechanical. Suppose 500 students out of which 200 are female and 300 are male, are distributed in the 4 branches as below. Test whether branch choice is related to gender. Test at 5% level of significance. 5

	CS	Civil	Electrical	Mechanical
Female	50	50	50	50
Male	100	80	70	50

12. a) The number of vehicles joining a fuel queue in a petrol bunk has Poisson distribution with parameter 5.8. Find the probability that: 5

i) No vehicle joins the fuel queue in a particular minute.

ii) 2 or more vehicles join the fuel queue in the minute.

b) Mean life of electric bulbs manufactured by a firm is 1200 hrs. and was
normally distributed with standard deviation of 200 hrs.   5

   i) In a box of 10,000 bulbs, how many bulbs are expected to have life of 1050
   hrs or more ?

   ii) What is the percentage of bulbs which are expected to fuse before
   1500 hrs of service ?

13. a) The following are the values of production (in thousand quintals) of a sugar
factory   8

Year	1992	1994	1996	1998	2000	2002	2004
Production	77	81	88	94	94	96	98

   i) Fit a straight line trend using least square method.

   ii) Graph the observed values and the trend values.

   iii) Estimate the production in the year 2006.

b) Name the components of time series.   2

14. A factory bought three new grinding machines of different brands and wishes to
determine whether one of them grinds better and faster than others. The grinders
were used for 5 hrs. and the values are observed at random from each grinder
and the results are given below :

Observed values :

Grinder A : 30   25   36   38   31

Grinder B : 35   31   39   38   42

Grinder C : 24   30   28   25   28

Use analysis of variance technique to determine whether the grinders are
significantly different in their mean grinding capacity.

Test at 5% level of significance.