BCA (CBCS) RUSA Vth Semester Examination

4000

COMPUTER ORIENTED STATISTICAL METHODS
Paper : BCA–0505

Time : 3 Hours]

[**Maximum Marks : 70**

Note :– Attempt any *five* questions. Attempt *one* question each from Parts B, C, D, and E. Marks are indicated against the question. Part A (both Q. Nos. 1 and 2) is compulaory.

Part–A

(Compulsory Questions)

1. Answer the following questions as directed :

   (i)   Median is not affected by the extreme points.

   (True/False)

   (ii) The probability of any event is either zero or one.

   (True/False)

(iii) Coefficient of dispersion (C.D.) based upon quartile deviation is C.D. $= \dfrac{Q_3 - Q_1}{Q_3 + Q_1}$.

(True/False)

(iv) The most stable measure of central tendency is :

(a) Mean
(b) Median
(c) Mode
(d) None of these

(Choose the correct option)

(v) $P(\overline{A}) = 1 + P(A)$.
(True/False)

(vi) A coin is tossed three times in succession, the number of sample points in sample space is :

(a) 6
(b) 8
(c) 3
(d) 9

(Choose the correct option)

(vii) In the simultaneous tossing of two perfect coins, the probability of having at least one head is :

(a) ½
(b) ¼
(c) ¾
(d) 1

(Choose the correct option)

(viii) The 'average' value of a random phenomenon is also termed as its expected value.

(True/False)

(ix) If X is a random variable, then $E(aX + bY) = aE(X) + bE(Y)$.
(True/False)

(x) If $V(X) = 1$, then $Var(2X + 3)$ is 4.

(True/False)

$1 \times 10 = 10$

2. Answer the following questions in **25** to **30** words :

(i) Explain the meaning of the word 'Statistics' as used in different sense.

(ii) Distinguish between absolute and relative measures of dispersion.

(iii) Discuss the merits and demerits of harmonic mean.

(iv) Give the classical and statistical definitions of probability.

(v) Explain the difference between product moment correlation coefficient and rank correlation coefficient.

$4 \times 5 = 20$

Part–B

3. (a) Find the mean of the following frequency distribution :

X	f
1	5
2	9
3	12
4	17
5	14
6	10
7	6

(b) Find the median for the following frequency distribution :

Variable	Frequency
10–20	12
20–30	30
30–40	34
40–50	65
50–60	45
60–70	25
70–80	18

2×5=10

P(A·B) = P(A) ~ P(B)

P(B)

4. From a sample of n observations, the arithmetic mean and variance are calculated. It is then found that one of the values, x_1, is the error and should be replaced by x_1'. Show that the adjustment to the variance to correct this error is :

$$\frac{1}{n}(x_1' - x_1)\left(x_1' + x_1 - \frac{x_1' - x_1 + 2T}{n}\right)$$

where T is the total of the original results.   10

Part–C

5. (a) A letter of English alphabet is chosen at random. Calculate the probability that the letter so chosen :

$\frac{21}{26} = 0.80$

(i) is a consonant

(ii) precedes r (in alphabetical order)

$\frac{9}{26} = 0.30$

(b) The probability that a student passes a Physics test is 2/3 and the probability that he passes both a Physics test and an English test is 14/45. The probability that he passes at least one test is 4/5. What is the probability that he passes the English test ?

2×5=10

$P(P) = \frac{2}{3}$, $\frac{P(P \text{ and } E) =}{P(P E)} \frac{14}{45}$, $P(P \text{ or } E) = \frac{4}{5}$

$P(P + E)$

$P(E) =$

6. (a) In a random arrangement of the letters of the word 'ENGINEERING', what is the probability that vowels always occur together ?

(b) A consignment of 15 record players contains 4 defectives. The record players are selected at random, one by one, and examined. Those examined are not pull back. What is the probability that the 9th one examined is the last defective ? 2×5=10

Part–D

7. An urn contains 7 white and 3 red balls. Two balls are drawn together at random from this urn. Compute the probability that neither of them is white. Find also the probability of getting one white, one red ball. Hence, compute the expected number of white balls drawn. 10

8. What is the expectation of the number of failures preceding the first success in an infinite series if independent trials with constant probability p of success in each trial ? 10

C–772 (6)

$P(A \cap B) = P(\cdot) \cdot P(\cdot \mid \cdot \cdot R)$

Part–E

9. Calculate the correlation coefficient for the following heights (in inches) of father (X) and their sons (Y) :

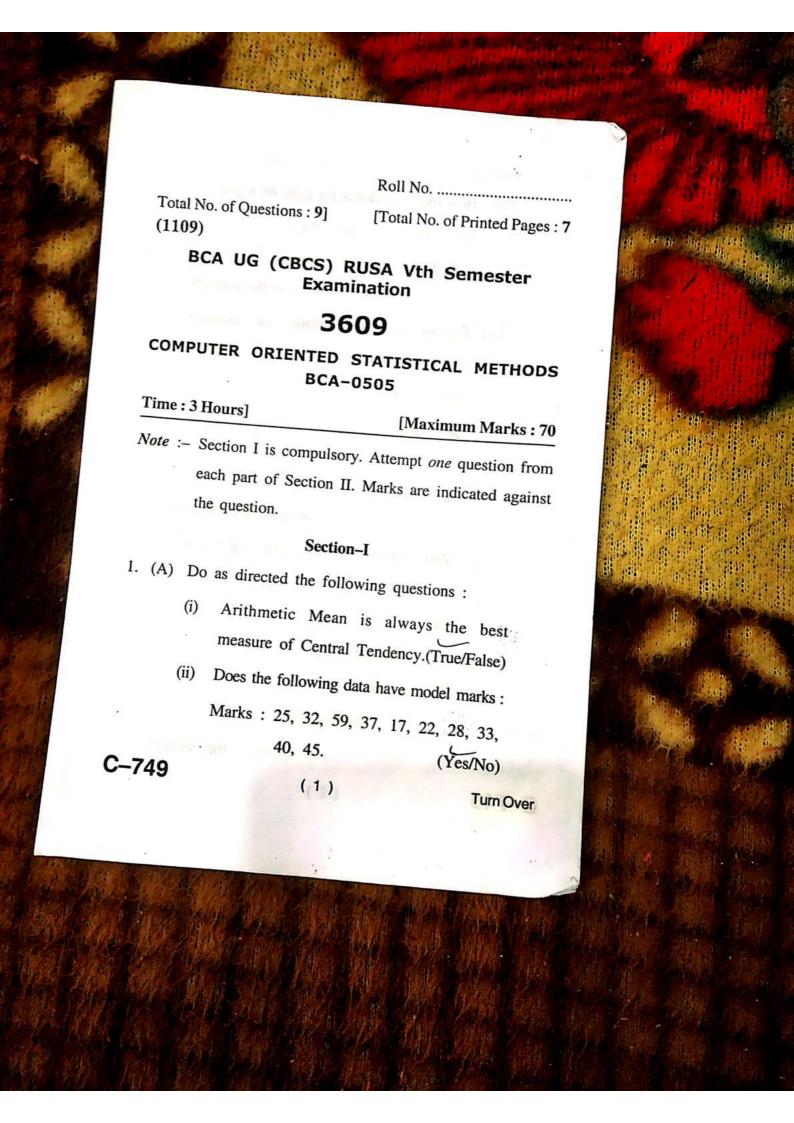| X	Y
65	67
66	68
67	65
67	68
68	72
69	72
70	69
72	71

10

10. The joint probability distributions of X and Y is given below :

X \ Y	−1	+1
0	1/8	3/8
1	2/8	2/8

Find the correlation coefficient between X and Y. 10

C–772 (7)

BCA UG (CBCS) RUSA Vth Semester Examination

3609

COMPUTER ORIENTED STATISTICAL METHODS
BCA–0505

Time : 3 Hours]

[Maximum Marks : 70

Note :– Section I is compulsory. Attempt *one* question from each part of Section II. Marks are indicated against the question.

Section–I

1. (A) Do as directed the following questions :

(i) Arithmetic Mean is always the best measure of Central Tendency.(True/False)

(ii) Does the following data have model marks :

Marks : 25, 32, 59, 37, 17, 22, 28, 33, 40, 45. (Yes/No)

(iii) How many quadrants are there on a graph ?

(a) One

(b) Two

(c) Four ✓

(d) Severn

(Choose the correct)

(iv) Ogives can be helpful in locating graphically the :

(a) Mode

(b) Mean ✓

(c) Median

(d) None of these

(Choose the correct)

(v) Which of the following is the best measure of dispersion ?

(a) Range

(b) Quartile deviation

(c) Mean deviation ✓

(d) Standard deviation

(Choose the correct)

(vi) What type of correlation will be there in the following data ?

X :	10	15	18	21
Y :	20	22	24	26

(a) Positive ✓

(b) Negative

(c) Zero

(d) None of these

(Choose the correct)

(vii) A bag contains 6 white balls, 9 black balls. What is the probability of drawing a black ball ?

(viii) Let P be the probability function on $S = \{a_1, a_2, a_3\}$. Find $P(a_1)$ if $P(a_2) = \dfrac{1}{3}$ and $P(a_3) = \dfrac{1}{4}$.

(ix) In a random throw of two dice, what is the expectation of the product of the points on them ?

(x) If X and Y are two independent random variables then what is the value of variance of (X – Y) ?

$1 \times 10 = 10$

(B) (i) Write a short note on merits and demerits of median.

(ii) Find the standard deviation of the following data :

48, 43, 65, 57, 31, 60, 37, 48, 59, 78.

(iii) Discuss the merits and limitations of Rank Correlation Coefficient.

(iv) What is mathematical expectation and what are its properties ? $4 \times 5 = 20$

Section–II

(Part–A)

2. Calculate Mean, Median and Mode of the following series :

Marks below	20	30	40	50	60	70	80	
No. of Students	5	15	42	60	72	78	80	10

3. Find the variance of the following distribution :

X	90–105	105–115	115–125	125–135	135–145	
f	19	23	36	70	52	10

(Part–B)

4. (a) A committee of three is to be chosen from a group of 4 men and 5 women. If the selection is made at random, find the probability that :

(i) All the three are men

(ii) Two are men

(b) A pair of dice is rolled. If the sum on the two dice is 9, find the probability that one of the dice showed 3. $2 \times 5 = 10$

5. (a) 'n' cadets have to stand in a row. If all permutations are equally likely, find the probability that two particular cadets stand side by side.

(b) Two cards are drawn from a well shuffled pack of playing cards. Determine the probability that both are aces. $2 \times 5 = 10$

(Part–C)

6. (a) Calculate the expected value of X, the sum of scores when two dice are rolled.

   (b) Calculate the variance for a random variable whose probability distribution is as follows :

x :	4	5	6	8
P :	0.1	0.3	0.4	0.2

2×5=10

7. A box contains 8 items of which two are defective. A man selects three items at random. Find the expected value of defective items he has drawn.   10

(Part–D)

8. Calculate the coefficient of correlation for the following data :

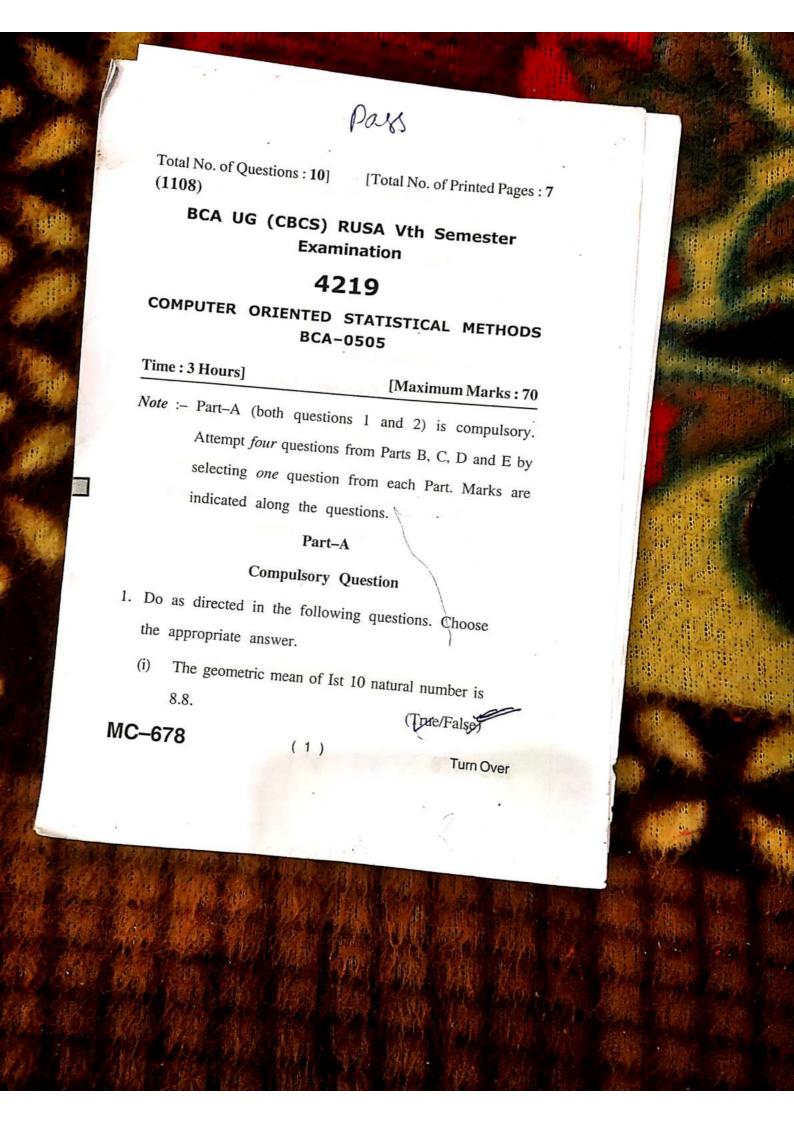   (1, 2), (2, 4), (3, 8), (4, 7), (5, 10), (6, 5), (7, 14), (8, 16) (9, 2), (10, 20).   10

9. Find Karl Pearson's correlation coefficient for the data given below :

Independent variable	Dependent variable
3	7
7	12
5	8
4	8
6	10
8	13
2	5
7	10

10

0.902

924556.78

Total No. of Questions : 10]   [Total No. of Printed Pages : 7
(1108)

BCA UG (CBCS) RUSA Vth Semester Examination

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COMPUTER ORIENTED STATISTICAL METHODS
BCA–0505

Time : 3 Hours]

[Maximum Marks : 70

Note :– Part–A (both questions 1 and 2) is compulsory. Attempt *four* questions from Parts B, C, D and E by selecting *one* question from each Part. Marks are indicated along the questions.

Part–A

Compulsory Question

1. Do as directed in the following questions. Choose the appropriate answer.

   (i) The geometric mean of Ist 10 natural number is 8.8.

   (True/False)

MC–678   (1)

(ii) For usual meanings, the formula $G = (x_1 x_2 \ldots x_n)^{1/n}$ stands for :

(a) Median

(b) Mean

(c) Mode

(d) Geometric mean

(iii) Coefficient of dispersion (C.D.) based upon

range $= \dfrac{A_{max} - B_{min}}{A_{max} + B_{min}}$. (True/False)

(iv) Median is rigidly defined. (True/False)

(v) The probability that a non-leap year selected at random will contain 53 Mondays is :

(a) $\dfrac{1}{7}$

(b) $\dfrac{2}{7}$

(c) $\dfrac{3}{7}$

(d) None of these

(vi) The probability of doublets in a single throw of two dice is $\dfrac{1}{6}$. (True/False)

MC–678 (2)

(vii) If X and Y are random variables, then $E(X + Y) = E(X) + E(Y)$, provided all the expectations exist. (True/False)

(viii) If X is a random variable, then $V(aX + b) = a^2 \, V \, (X)$, where a and b are constants. (True/False)

(ix) Correlation coefficient is independent of change of origin and scale. (True/False)

(x) $r_{XY} = 0 \Rightarrow$ X and Y are independent. (True/False)

$10 \times 1 = 10$

2. Answer the following questions in 25 to 50 words.

(i) Discuss merits and demerits of arithmetic mean.

(ii) Explain measures of dispersion.

(iii) State and prove the addition theorem of probability. (for two events)

(iv) Discuss the variance of a linear combinations of n random variables.

(v) Discuss Karl Pearson's coefficient of correlation.

$5 \times 4 = 20$

MC–678 (3) Turn Over

Part–B

3. (a) Find the mean for the following frequency distribution :

Class Interval	Frequency
0–8	8
8–16	7
16–24	16
24–32	24
32–40	15
40–48	7

(b) Find the median wage of the following distribution :

Wages (In Rs.)	No. of Workers
2,000–3,000	3
3,000–4,000	5
4,000–5,000	20
5,000–6,000	10
6,000–7,000	5

2×5=10

4. The first of the two samples has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15.6 and standard deviation $\sqrt{13.44}$, find the standard deviation of the second group. **10**

Part–C

5. (a) Twenty five boots are placed at random in a shelf. Find the probability that a particular pair of boots shall be always together.

(b) Two dice are tossed. Find the probability of getting 'an even number on the first die or a total of 8'. 2×5=10

6. (a) A bag contains 17 counters marked with the numbers 1 to 17. A counter is drawn and replaced; a second drawing is then made. What is probability that the first number drawn is even and the second odd ?

(b) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each colour. 2×5=10

Part–D

7. (a) Find the expectation of the number on a die when thrown.

   (b) A box contains 'a' white and 'b' black balls. 'c' balls are drawn at random. Find the expected value of the number of white balls drawn. $2 \times 5 = 10$

8. A man with 'n' keys wants to open his door and tries the keys independently at random. Find the mean and variance of the number of trials required to open the door, (i) if unsuccessful keys are not eliminated from further selection, and (ii) if they are. 10

Part–E

9. Calculate the coefficient of correlation between X and Y for the following :

X	1	3	4	5	7	8	10
Y	2	6	8	10	14	16	20

10

$$r = \frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{N\Sigma X^2 - (\Sigma X)^2}\ \sqrt{N\Sigma Y^2 - (\Sigma Y)^2}}$$

10. The joint probability distributions of X and Y is given below :

Y \ X	−1	+1
0	$\frac{1}{8}$	$\frac{3}{8}$
1	$\frac{2}{8}$	$\frac{2}{8}$

Find the correlation coefficient between X and Y.   10

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Total No. of Questions : 10]   [Total No. of Printed Pages : 7
(1107)

B.C.A. UG (CBCS) RUSA Vth Semester Examination

3850

COMPUTER ORIENTED STATISTICAL METHODS
BCA-505

Time : 3 Hours]   [Maximum Marks : 70

Note :– Part–A (both questions 1 and 2) is compulsory. Attempt *four* questions from Parts B, C, D and E by selecting *one* question from each Part. Marks are indicated along the questions.

Part–A

Compulsory Question

1. Do as directed in the following questions. Choose the appropriate answer.

    (i) The arithmetic mean of Ist 10 natural numbers is 55.

    (True/False)

CA–594   (1)   Turn Over

(ii) For usual meanings, the formula $\bar{x} = \frac{1}{N}\Sigma fx$ stands for :

(a) Mean   (b) Median

(c) Harmonic mean   (d) Geometric mean

(iii) The coefficients of dispersion (C.D.) based on standard deviation is C.D. $= \frac{S.D.}{Mean}$.

(True/False)

(iv) The weighted arithmetic mean of the first 'n' natural numbers is :

(a) $\frac{2n+1}{3}$ (b) $\frac{n+1}{3}$

(c) $\frac{2n+1}{2}$ (d) None of these

(v) The chance that a leap year selected at random will contain 53 sundays is :

(a) $\frac{1}{7}$ (b) $\frac{2}{7}$

(c) $\frac{3}{7}$ (d) None of these

(vi) Two unbiased dice are thrown. Then total number of exhaustive cases are 36.

(True/False)

(vii) $cov(X + a, Y + b) = cov(X, Y)$. (True/False)

(viii) If X and Y are random variables taking real values, then $[E(XY)]^2 \le E(X^2).E(Y^2)$.

(True/False)

(ix) Two independent variables are uncorrelated.

(True/False)

(x) $r_{XY} > 0 \Rightarrow E(XY) > E(X)\ E(Y)$. $10\times1=10$

2. Answer the following questions in **25** to **50** words.

(i) What are the merits and demerits of median ?

(ii) Discuss coefficients of dispersion.

(iii) State and prove the multiplication theorem of probability. (for two events).

(iv) Discuss the covariance of two random variables X and Y.

(v) Write a brief note on the correlation table.

$5\times4=20$

Part-B

3. (a) Calculate the arithmetic mean of the marks from the following table :

Marks	No. of Students
0–10	12
10–20	18
20–30	27
30–40	20
40–50	17
50–60	6

(b) A cyclist pedals from his house to his college at a speed of 10 k.m. p.h. and back from the college to his house at 15 km p.h. Find the average speed.

$2 \times 5 = 10$

4. Calculate the mean and standard deviation for the following table giving the age distribution of 542 members :

Age (in years)	No. of Members
20–30	3
30–40	61
40–50	132
50–60	153
60–70	140
70–80	51
80–90	2

10

Part-C

5. (a) 'n' persons are seated on 'n' chairs at a round table. Find the probability that two specified persons are sitting next to each other.

(b) If two dice are thrown, what is the probability that the sum is neither 7 nor 11 ?

$2 \times 5 = 10$

6. (a) A consignment of 15 record players contains 4 defective. The record players are selected at random, one by one, and examined. Those examined are not put back. What is the probability that the 9th one examined is the best defective ?

(b) Let A and B be two events such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$, show that $\frac{3}{8} \leq P(A \cap B) \leq \frac{5}{8}$.

$2 \times 5 = 10$

Part–D

7. (a) Let X be a random variable with the following probability distribution :

x :	-3	6	9
$P(X = x)$:	$\dfrac{1}{6}$	$\dfrac{1}{2}$	$\dfrac{1}{3}$

Find $E(X)$ and $E(X^2)$ and using the laws of expectation, evaluate $E(2X + 1)^2$.

(b) A box contains 2^n tickets among which ^nc_i tickets bear the number i; $i = 0, 1, 2, ..., n$. A group of m tickets is drawn. What is the expectation of the sum of their numbers ? $2 \times 5 = 10$

8. In a sequence of Bernoulli trials, let X be the length of the run of either successes or failures starting with the first trial. Find $E(X)$ and $V(X)$. 10

Part–E

9. Calculate the correlation coefficient for the following heights (in inches) of fathers (X) and their sons (Y) :

X :	65	66	67	67	68	69	70	72	
Y :	67	68	65	68	72	72	69	71	10

10. Ten competitors in a musical test were ranked by the three judges A, B and C in the following order :

Ranks by A : 1 6 5 10 3 2 4 9 7 8

Ranks by B : 3 5 8 4 7 10 2 1 6 9

Ranks by C : 6 4 9 8 1 2 3 10 5 7

Using rank correlation method, discuss which pair of judges has the nearest approach to common likings in music. 10