

FACULTY OF INFORMATICS

BCA. (CBCS) II-Semester Examination

Fundamentals Probability & Statistics

Time: 3 Hours

Max. Marks: 70

Note: (i) Answer all questions from PART-A, and five questions from PART-B, choosing one question from each unit.

(ii) Missing data, if any, may be suitably assumed.

PART-A (10 × 2 = 20 Marks)

- (a) Define the term population. (Unit-I, Page No. 2, Q2)
- (b) What is frequency distribution? (Unit-I, Page No. 3, Q7)
- (c) Define range. (Unit-II, Page No. 47, Q5)
- (d) Explain Kurtosis. (Unit-II, Page No. 47, Q8)
- (e) Explain axiomatic approach of probability. (Unit-III, Page No. 92, Q5)
- (f) Prove that for any three events A, B and C

$$P(A \cup B | C) = P(A | C) + P(B | C) - P(A \cap B | C).$$
 (Unit-III, Page No. 93, Q8)
- (g) Define discrete random variable with examples. (Unit-IV, Page No. 126, Q1)
- (h) Bring out the differences between Binomial and Poisson distribution. (Unit-IV, Page No. 127, Q10)
- (i) Define Regression. (Unit-V, Page No. 162, Q3)
- (j) Write two characteristics of t-distribution. (Unit-V, Page No. 163, Q8)

PART-B (5 × 10 = 50 Marks)

Unit-I

- (a) Explain the scope and importance of statistics. (Unit-I, Page No. 6, Q13)
- (b) Explain the methods of collecting primary data with merits and demerits. (Unit-I, Page No. 10, Q18)

OR

- (a) What is frequency distribution? Explain about univariate and bivariate frequency distribution. (Unit-I, Page No. 17, Q27)
- (b) Define the term population and sample. What are the ways into which samples are classified? (Unit-I, Page No. 7, Q14)

Unit-II

- (a) What do you mean by measures of central tendency? List out the characteristics of a good measure of central tendency. (Unit-II, Page No. 48, Q11)
- (b) Define Range. State its merits, demerits and uses. (Unit-II, Page No. 64, Q36)

OR

5. (a) Explain the calculation of standard deviation for continuous series with the help of an example. (Unit-II, Page No. 74, Q48)
- (b) The first four moments of a distributions, about the value 5 of the variable are 2, 20, 40 and 50. Find the moments about mean, β_1 and β_2 . Also find moments about origin. (Unit-II, Page No. 78, Q52)

Unit-III

6. (a) In a single throw of two fair dice determine the probability of getting,
- (i) A total of 2
 - (ii) A total of 10 and
 - (iii) A total of 7 or 9.
- (b) An urn contains 10 white, 4 red and 5 black balls. If 3 balls are drawn at random, find the probability that:
- (i) Two of the balls drawn are white (ii) One is of each colour
 - (iii) None is red (iv) Atleast one is white.

OR

7. (a) What is conditional probability? (Unit-III, Page No. 107, Q35)
- (b) State and prove Baye's theorem. Give its importance. (Unit-III, Page No. 117, Q53)

Unit-IV

8. (a) What is random variable? Explain with examples. (Unit-IV, Page No. 128, Q11)
- (b) Two unbiased dice are thrown. Find the expected value of the sum of number of points on them. (Unit-IV, Page No. 134, Q24)

OR

9. (a) Explain poisson distribution with example. (Unit-IV, Page No. 144, Q41)
- (b) For a certain normal distribution, the first moment about 10 is 40 and the fourth moment about 50 is 48. What is the arithmetic mean and standard deviation of the distribution? (Unit-IV, Page No. 155, Q57)

Unit-V

10. (a) Explain the different kinds of correlation. (Unit-V, Page No. 163, Q12)
- (b) Calculate correlation coefficient for the following heights of fathers (x) and sons (y) in inches. (Unit-V, Page No. 168, Q15)

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

OR

11. (a) Explain about simple linear regression for two variables. (Unit-V, Page No. 175, Q25)
- (b) Discuss in brief about,
- (i) t-test for single mean
 - (ii) t-test for difference between two means. (Unit-V, Page No. 182, Q35)

FACULTY OF INFORMATICS**BCA. (CBCS) II-Semester Examination****Fundamentals Probability & Statistics**

e: 3 Hours

Max. Marks: 70

- e: (i) Answer all questions from PART-A, and five questions from PART-B, choosing one question from each unit.
- (ii) Missing data, if any, may be suitably assumed.

PART-A (10 × 2 = 20 Marks)

- (a) Discuss the sources and importance of collection secondary data.
- (b) Distinguish between histogram and Ogive curve.
- (c) List out the characteristics of a good measure of central tendency.
- (d) Write short notes on Sheppard's correction for moments.
- (e) Discuss briefly the importance of probability.
- (f) In a single throw of two fair dice. Determine the probability of getting a total of 7 or 9.
- (g) State multiplication theorem of expectation.
- (h) Derive the coefficient of skewness and kurtosis of binomial distribution.
- (i) State the properties of regression coefficients in simple linear regression model.
- (j) Write the applications of χ^2 -distribution.

Solutions

- (Unit-I, Page No. 2, Q5)
- (Unit-I, Page No. 4, Q10)
- (Unit-II, Page No. 46, Q1)
- (Unit-II, Page No. 47, Q9)
- (Unit-III, Page No. 92, Q2)
- (Unit-III, Page No. 93, Q7)
- (Unit-IV, Page No. 126, Q4)
- (Unit-IV, Page No. 127, Q6)
- (Unit-V, Page No. 162, Q5)
- (Unit-V, Page No. 163, Q10)

PART-B (5 × 10 = 50 Marks)**Unit-I**

- (a) Explain about quantitative and qualitative data.
- (b) What is tabulation? Explain the objectives of tabulation.
Explain essential parts of table.

OR

- (a) Discuss about different types of diagrams.
- (b) Explain the technique and rules for constructing graphs.

(Unit-I, Page No. 8, Q16)

(Unit-I, Page No. 15, Q24)

(Unit-I, Page No. 22, Q35)

(Unit-I, Page No. 32, Q39)

Unit-II

- (a) What is arithmetic mean? Write its merits and demerits.
- (b) Explain the calculation of quartile deviation for individual and discrete series.

(Unit-II, Page No. 48, Q12)

(Unit-II, Page No. 67, Q39)

OR

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5. (a) Define moment. Discuss its importance. Mention the different types of moments. (Unit-II, Page No. 75, Q49)
 (b) Calculate Karl Pearson's coefficient of skewness. (Unit-II, Page No. 82, Q58)

X	10	11	12	13	14	15
f	2	4	10	8	5	1

Unit-III

6. (a) Discuss the different approaches or definitions of probability. (Unit-III, Page No. 97, Q15)
 (b) State and prove addition theorem of probability for any two events. (Unit-III, Page No. 103, Q23)

OR

7. (a) A box contains 5 Red, 3 White and 4 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. (Unit-III, Page No. 113, Q44)
 (b) The chances of A, B, C becoming managers of a company are 4 : 2 : 3. The probabilities that salaries will be revised if A, B, C become managers are 0.3, 0.5 and 0.8 respectively. If the salaries are revised, what are the probabilities that A, B and C are appointed as managers? (Unit-III, Page No. 117, Q54)

Unit-IV

8. (a) What is meant by expectation? State and prove its properties. (Unit-IV, Page No. 132, Q21)
 (b) In a binomial distribution consisting of 5 independent trials, probabilities of 1 and 2 success are 0.4096 and 0.2048 respectively. Find the parameter p of the distribution. (Unit-IV, Page No. 143, Q38)

OR

9. (a) What is Normal Distribution? Write the importance and applications of normal distribution. (Unit-IV, Page No. 149, Q49)
 (b) A large group of mean 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean and standard deviation. (Unit-IV, Page No. 153, Q54)

Unit-V

10. (a) Define multiple correlation for three variables and give the formulae for the same. (Unit-V, Page No. 171, Q20)
 (b) If $r_{12} = 0.77$, $r_{13} = 0.72$ and $r_{23} = 0.52$. Find the values of $R_{1,23}$, $R_{2,13}$ and $R_{3,12}$. (Unit-V, Page No. 172, Q22)

OR

11. (a) In one sample of 8 observations the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in the other sample of 10 observations it was 102.6. Test whether this difference is significant at 5% level. (Unit-V, Page No. 186, Q44)
 (b) Explain χ^2 -test for independence of attributes. (Unit-V, Page No. 188, Q49)

FACULTY OF INFORMATICS**BCA. II - Semester (CBCS) (Main) (New) Examination****November - 2020****FUNDAMENTALS OF PROBABILITY AND STATISTICS**

Time: 2 Hours

Max. Marks: 70

PART-A (5 × 2 = 10 Marks)

Ques: Answer any Five questions.

Solutions

Give any two types of Bar diagram with a diagram. (Unit-I, Page No. 3, Q9)

Define Stratified random sampling. (Unit-I, Page No. 2, Q3)

Define mutually exclusive events and independent events. (Unit-III, Page No. 93, Q6)

In a single throw of two fair dice. Determine the probability of getting a total of 7 or 9. (Unit-III, Page No. 93, Q7)

Define normal distribution. (Unit-IV, Page No. 127, Q7)

Define beta distribution of second kind. (Out of Syllabus)

Prove that $E[aX + b] = aE(X) + b$, where a, b are constants. (Unit-IV, Page No. 127, Q8)

What is frequency distribution? (Unit-I, Page No. 3, Q7)

Define Critical region. (Unit-V, Page No. 163, Q6)

Write two characteristics of t-distribution. (Unit-V, Page No. 163, Q8)

PART-B (4 × 15 = 60 Marks)

Ques: Answer any Four questions.

(a) Write about the rules for constructing frequency table. (Unit-I, Page No. 20, Q30)

(b) Explain about various Graphical representations. (Unit-I, Page No. 34, Q41)

(a) Explain the exploratory data analysis. (Out of Syllabus)

(b) Represent the data below as a pie diagram. (Unit-I, Page No. 38, Q44)

Commodity	Value in Crores
C1	3500
C2	2500
C3	1800
C4	1200
C5	800
C6	500

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13. (a) State and prove Multiplication theorem of Probability. (Unit-III, Page No. 108, Q36)
- (b) A product is supposed to contain 50% defective items. What is the probability that a sample of 8 items contain less than 2 defective items? (Unit-IV, Page No. 143, Q37)
14. (a) If A and B are events in a sample space. Prove that $P(\bar{A} \cap B) = P(B) - P(A \cap B)$. (Unit-III, Page No. 103, Q22)
- (b) A book has 500 pages with 100 known errors. If the number of such errors per page has Poisson distribution. What is the probability that a particular page has no errors, 1 error, 2 errors? (Unit-IV, Page No. 149, Q48)
15. Define uniform distribution over an interval $(-a, a)$ and find its skewness. (Out of Syllabus)
16. Derive Mean and Variance of Beta Distribution of First kind. (Out of Syllabus)
17. State and prove Multiplication theorem of expectation for 2 continuous random variables. (Unit-IV, Page No. 136, Q29)
18. Find the mode of the following distribution. (Unit-II, Page No. 58, Q27)
- | X | 0 – 4 | 5 – 9 | 10 – 14 | 15 – 19 | 20 – 24 | 25 – 29 |
|---|-------|-------|---------|---------|---------|---------|
| F | 30 | 27 | 48 | 14 | 32 | 24 |
19. Write the procedure of t-test for differences between means of small samples. (Unit-V, Page No. 182, Q35)
20. Calculate the coefficient of correlation for following data. (Unit-V, Page No. 178, Q29)
- | X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|----|----|----|----|----|----|----|
| Y | 9 | 8 | 10 | 12 | 11 | 13 | 14 | 16 | 15 |

Explanatory Variable	Response Variable
1	9
2	8
3	10
4	12
5	11
6	13
7	14
8	16
9	15

FACULTY OF INFORMATICS

BCA. II-Semester (CBCS) (Main & Backlog) (New) Examination

November - 2021

Subject: Fundamentals of Probability and Statistics

Time: 2 Hours

Max. Marks: 70

(Missing data, if any, may be suitably Assumed)

PART-A (5 × 2 = 10 Marks)

Ques: Answer any five questions.

Solutions

Discuss the sources and importance of collection secondary data.

(Unit-I, Page No. 2, Q5)

Distinguish between histogram and ogive curves.

(Unit-I, Page No. 4, Q10)

Define mutually exclusive event.

(Unit-III, Page No. 93, Q6)

What is sample space?

(Unit-III, Page No. 92, Q3)

Define rectangular uniform distribution.

(Out of Syllabus)

What is mean of normal distribution?

(Unit-IV, Page No. 127, Q9)

Define range.

(Unit-II, Page No. 47, Q5)

Define standard deviation.

(Unit-II, Page No. 47, Q6)

What is large sample test procedure?

(Out of Syllabus)

Define regression.

(Unit-V, Page No. 162, Q3)

PART-B (4 × 15 = 60 Marks)

Ques: Answer any Four questions.

(Unit-I, Page No. 15, Q24)

(a) What is tabulation?

(Unit-I, Page No. 15, Q24)

(b) Construct a frequency distribution table with suitable title using the following information. Out of 100 students in a class consisting of 60 boys, 30 wear glasses and 75 passed in a test. Of the boys, 40 passed in the test including 15 wearing glasses. In all 20 boys wear glasses. Among the students wearing glasses 24 passed.

(Unit-I, Page No. 21, Q32)

(Unit-I, Page No. 14, Q23)

(a) Explain the types of classification of data.

(Out of Syllabus)

(b) Distinguish between census and sample survey methods.

(Unit-III, Page No. 109, Q38)

(a) Define independent events.

(Unit-III, Page No. 109, Q38)

(b) In a single throw of two fair dice determine the probability of getting (i) a total of 2 (ii) a total of 10 and (iii) a total of 7 or 9.

(Unit-III, Page No. 97, Q14)

(a) Define binomial distribution.

(Unit-IV, Page No. 138, Q32)

(b) Suppose X has a binomial distribution with parameters 6 and 1/2. Show that X = 3 is the most likely outcome.

(Unit-IV, Page No. 144, Q40)

15. (a) Define gamma distribution. (Out of Syllabus)
- (b) Obtain gamma distribution mean, variance and moment generating function. (Out of Syllabus)
16. (a) Define beta distribution of first kind. (Out of Syllabus)
- (b) Obtain mean and variance of beta distribution of first kind. (Out of Syllabus)
17. (a) Define joint probability density function. (Out of Syllabus)
- (b) Two random variable X and Y have the following joint probability density function: $F(x, y) = 1/8(4 - x - y); 0 \leq x \leq 2, 0 \leq y \leq 2 = 0$ Otherwise. (Out of Syllabus)
18. (a) Define Bowley's co-efficient of skewness. (Unit-II, Page No. 80, Q55)
- (b) Find Bowley's coefficient of skewness by considering the following data?
- | Sales (Rs in lakhs) | Below 50 | 50-60 | 60-70 | 70-80 | 80 and above |
|---------------------|----------|-------|-------|-------|--------------|
| No. of companies | 8 | 12 | 20 | 25 | 15 |
- (Unit-II, Page No. 82, Q59)
19. (a) Obtain the limits for correlation coefficient. (Unit-V, Page No. 167, Q14)
- (b) For certain X and Y series, which are correlated, the two lines of regression are $5x - 6y + 90 = 0$ and $15x - 8y - 130 = 0$.
- Find the mean of the two series and the correlation coefficient. (Unit-V, Page No. 180, Q30)
20. (a) Define regression equation. (Unit-V, Page No. 175, Q25)
- (b) Find the regression equation of Y on X from the following data:
- $$\sum X = 56, \sum Y = 56, \sum X^2 = 476, \sum XY = 469, n = 7$$
- (Unit-V, Page No. 180, Q31)

FACULTY OF INFORMATICS**BCA. (CBCS) II – Semester (Main & Backlog) (New) Examination****June/July - 2022****Subject: Fundamentals of Probability & Statistics**

Time: 3 Hours

Max. Marks: 70

Note: (i) Answer all questions from PART-A, and five questions from PART-B, choosing one question from each unit.

(ii) Missing data, if any, may be suitably assumed.

PART-A (10 × 2 = 20 Marks)**Solutions**

1. (a) What is class interval and write about inclusive and exclusive intervals? (Unit-I, Page No. 3, Q8)
- (b) Define primary data. (Unit-I, Page No. 2, Q4)
- (c) Define Random Experiment. (Unit-III, Page No. 92, Q4)
- (d) Explain sample space. (Unit-III, Page No. 92, Q3)
- (e) Write two laws of probability. (Unit-III, Page No. 92, Q5)
- (f) Explain uniform Distribution. (Out of Syllabus)
- (g) Define Skewness. (Unit-II, Page No. 47, Q7)
- (h) Explain Kurtosis. (Unit-II, Page No. 47, Q8)
- (i) What is correlation? (Unit-V, Page No. 162, Q1)
- (j) Define Regression analysis. (Unit-V, Page No. 162, Q4)

PART-B (5 × 10 = 50 Marks)**Unit-I**

2. (a) Following data relate to the expenditure of two families per month

Item	Family A	Family B
Food	160	60
Clothing	100	30
Education	80	50
Other	80	30
Total	420	170

Represent the data by a Pie Diagram. (Unit-I, Page No. 37, Q43)

(b) Difference between classification and tabulation. (Unit-I, Page No. 13, Q21)

OR

3. (a) Write about frequency distribution. (Unit-I, Page No. 17, Q27)

(b) Explain Data diagrams with examples. (Unit-I, Page No. 22, Q35)

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Unit-II

4. (a) A card is drawn from a pack of playing cards. What is the probability that it is either a spade or an ace? (Unit-III, Page No. 106, Q28)
- (b) A coin is tossed six times. What is the probability of obtaining heads and tails alternately? (Unit-III, Page No. 107, Q32)

OR

5. (a) Explain Poisson distribution with example. (Unit-IV, Page No. 144, Q41)
- (b) Define all types of events. (Unit-III, Page No. 95, Q12)

Unit-III

6. (a) If X is normally distributed with mean = 40 and SD = 5. Find,
 (i) $P(32 \leq X \leq 50)$ (ii) $P(X \leq 25)$ (iii) $P(X \leq 44)$ (iv) $P(45 \leq X \leq 50)$. (Unit-IV, Page No. 154, Q55)
- (b) Explain characteristics of Normal Distribution. (Unit-IV, Page No. 151, Q51)

OR

7. (a) A large group of men 5% are under 60 inches in height and 40% are between 60 and 65 inches. Assuming a normal distribution, find the mean and standard deviation. (Unit-IV, Page No. 153, Q54)
- (b) What is the Probability that variable z lies between 0 and 1.83? (Unit-IV, Page No. 155, Q56)

Unit-IV

8. (a) The first 3 moments of a distribution about 2 are 1, 16 and 40. Find out the mean variance and examine the skewness of the distribution. (Unit-II, Page No. 83, Q60)
- (b) Find the expectation of a number when a dice is thrown. (Unit-IV, Page No. 135, Q26)

OR

9. (a) Discuss the terms skewness and kurtosis. (Unit-II, Page No. 83, Q61)
- (b) Write about Mathematical expectation. (Unit-IV, Page No. 132, Q20)

Unit-V

10. (a) From the following data, obtain the two regression equations. (Unit-V, Page No. 180, Q32)

X	15	18	15	17	30	35
Y	50	65	82	95	110	120

- (b) Define Correlation. (Unit-V, Page No. 164, Q11)

OR

11. (a) In a sample of 500 from a village 280 are found to be wheat eaters and the rest rice eaters, can we assume that both the food articles are equally popular? (Out of Syllabus)
- (b) Explain Rank correlation. (Out of Syllabus)



FACULTY OF INFORMATICS**B.C.A. II-Semester (CBCS) (New) (Main & Backlog) Examination****July - 2023****Subject: Fundamentals of Probability and Statistics**

Time: 3 Hours

Max. Marks: 70

Note: I. Answer all questions from PART-A and answer any five questions from PART-B, choosing one question from each unit.

II. Missing data, if any, may be suitably assumed.

PART-A (10 × 2 = 20 Marks)

1. (a) Define Statistics.
- (b) Define Inclusive and Exclusive series.
- (c) Find the mode for the following data:

X	1	2	3	4	5
f	5	10	15	10	5

- (d) What are the measures of Skewness?
- (e) When two dice are thrown, find the probability that the sum of the numbers is either 10 or 11.
- (f) Define Conditional Probability.
- (g) Define Random variable.
- (h) Define Poisson distribution.
- (i) Define Correlation.
- (j) Define Null and alternative hypothesis.

PART-B (5 × 10 = 50 Marks)**Unit-I**

2. A family budget is distributed as for Food Rs. 240, clothing Rs. 100, House rent Rs. 120, Fuel Rs. 36, Recreation Rs. 24, Transport Rs. 48, Insurance and savings Rs. 32, Education Rs. 70 and miscellaneous Rs. 50. Represent this with the help of Pie diagram.

OR

3. Discuss the merits and demerits of Sampling.

Unit-II

4. Compute the median from the following data.

Mid value	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	3

OR

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5. Calculate standard deviation for the following data.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	4	11	20	41	45	3	15	9	5

Unit-III

6. A card is drawn from cards numbered 1 to 50. If a card is drawn from a pack of cards, find the probability of getting a card which is a multiple of 3 or multiple of 5.

OR

7. State and prove Baye's theorem on probability.

Unit-IV

8. A random variable X has the probability function

X	0	1	2	3	4	5	6	7	8
P(X)	a	3a	5a	7a	9a	11a	13a	15a	17a

Determine,

- (i) Value of a
- (ii) Find $P(X < 3)$
- (iii) $P(0 < X < 5)$

OR

9. Ten coins are thrown simultaneously. Find the probability of getting at least (i) Seven heads (ii) Six heads.

Unit-V

10. Compute Karl Pearson's coefficient of correlation from the following data.

X	3	4	6	7	10
Y	9	11	14	15	16

OR

11. The following are the regression equations,

$$8x - 10y + 66 = 0, 40x - 18y - 214 = 0$$

- (i) Find \bar{x}, \bar{y}
- (ii) Regression coefficient
- (iii) Correlation coefficient.