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CHRIST UNIVERSITY, BANGALORE-560029
B.Sc. I End Semester Examination October 2009

Code: STA131 **Max. Marks: 100**

Sub: Basic Statistics & Probability **Duration: 3 Hrs**

SECTION - A

Answer any TEN questions. Each question carries TWO marks. **10 x 2 = 20**

1. List any two advantages of secondary data collection
2. Define the following: a. correspondent b. informant
3. Define a discrete variable and give an example
4. What are open end class intervals? Give an example.
5. Define the term measures of central tendency.
6. Define standard deviation
7. Prove that probability of an event lying between 0 and 1.
8. Define distribution function of a continuous random variable.
9. Give an example of a continuous random variable.
10. Define mathematical expectation of discrete random variable.
11. If E(X) = 8, find E(9X), E(2X+6).
12. Define moment generating function.

SECTION – B

Answer any FOUR questions. Each question carries SIX marks. **4 x 6 = 24**

13. For the following scores show the amount of weight lost (in pounds) by each client of a weight control clinic during the last year draw suitable stem and leaf display.

10	13	22	26	46	16	23	35	53	17
32	41	35	24	33	27	16	20	60	48
43	52	31	17	20	33	18	23	8	24
15	26	46	30	19	22	13	22	14	21
42	19	26	57	7	16	26	60	48	68
53	20	33	11	25	9	48	17	21	24
18	16	21	52	31	34	28	42	19	16

14. What are the properties of a good average? Examine these properties with reference to Arithmetic mean.
15. Write short notes on Gini's coefficient.
16. Define a null event and prove that the probability of a null event is zero.
17. State and prove addition theorem of expectation for a discrete random variable.
18. Write a short note on uniqueness theorem of moment generating function. What is moment generating function of a random variable X about a point A if (1)X is discrete? 2)continuous

SECTION – C

Answer any FOUR questions. Each question carries FOURTEEN marks. $4 \times 14 = 56$

19. a. Explain different methods of primary data collection
    b. Describe the construction of percentage bar chart.
20. a. Show that the sum of squared deviations is minimum when taken about mean.
    b. Distinguish between absolute and relative measures of dispersion. Discuss various measures of absolute and relative measures of dispersion.
21. a. Find the mean deviation from the mean and standard deviation of the arithmetic progression a, a+d, a+2d, a+3d, …, a+2nd and verify that the latter is greater than the former.
    b. Write short notes on moments. Explain the role of moments in studying the characteristics of a distribution?
22. a) Prove that $P(A^c \cap B) = P(B) - P(A \cap B)$
    $P(A \cap B^c) = P(A) - P(A \cap B)$
    b) Define mutually exclusive events. State addition theorem for mutually exclusive events. (8+6)
23. a) If A and B are mutually independent, prove that A.B and C are also independent.
    b) If A, B, C are pair wise independent and A is independent of BUC, then A, B and C are mutually independent. (7+7)
24. (a) Let X be a continuous random variable with pdf $f_X(x)$. Let $y=g(x)$ be strictly monotonic function of x. Assume that g(x) is differentiable and hence continuous for all x. Then the pdf of the random variable Y is given by $h_Y(y)= f_X(x) \left|dx/dy\right|$ where x is expressed in terms of y.
    (b) If the cumulative distribution function of X is F(x), find the cumulative distribution function of (i) $Y=X-b$ (ii) $Y=aX$

CHRIST UNIVERSITY, BANGALORE-560029
I B.Sc End Semester Examination October 2010

Code: STA131
Sub:Basic Statistics & Probability

Max. Marks: 100
Duration: 3 Hrs

SECTION - A

Answer any 10 questions. **10 x 2 = 20**

1. Define statistics
2. List any two sources of secondary data.
3. Distinguish between discrete and continuous variables
4. Distinguish between dichotomy and bifold classification.
5. Name the two positional averages.
6. Define mean deviation about an arbitrary value A
7. Find the probability of getting an even number when a fair die is thrown once.
8. Give an example of a discrete random variable.
9. Define distribution function of a continuous random variable.
10. State addition theorem of expectation.
11. If E(X) = 8, find E(8X), E(9X+6).
12. If V(X) = 5, find V(4X), V(2X+8).

SECTION - B

Answer any 4 questions. **4 x 6 = 24**

13. The daily high and low temperatures for 20 cities follow:

City	High	Low	City	High	Low
Athens	75	54	Melbourne	66	50
Bangkok	92	74	Montreal	64	52
Cairo	84	57	Paris	77	55
Copenhagen	64	39	Rio de Janeiro	80	61
Dublin	64	46	Rome	81	54
Havana	86	68	Seoul	64	50
Hong Kong	81	72	Singapore	90	75
Johannesburg	61	50	Sydney	68	55
London	73	48	Tokyo	79	59
Manila	93	75	Vancouver	57	43

(a) Prepare a stem and leaf display for the high temperatures and low temperatures. (b) Compare the stem and leaf displays from part (a) and make some comments about the difference daily high and low temperatures.

14. List the merits and demerits of geometric mean

15. Write short notes on Lorenz curve.

16. Define pairwise and mutually independent events. How many conditions are present for mutual independence independence of n events.

17. If X is a random variable and a is a constant, prove that $E(aX+b) = a E(X)+b$ if i. X is discrete ii. X is continuous

18. Write the formula for moment generating function r about origin when X is

i) discrete
ii) continuous

SECTION - C

Answer any 4 questions. **4 x 14 = 56**

19. a. Explain different methods of primary data collection

b. Describe the construction of a pie chart, giving suitable example

20. a. Distinguish between absolute and relative measures of dispersion. Discuss various measures of absolute and relative measures of dispersion.

b. Let r be the range and s be the standard deviation of a set of n observations. Then prove that $s \leq r$.

21. a. Prove that for any discrete distribution standard deviation is not less than mean deviation from mean.

b. Express raw moments in terms of central moments

22. a) Prove that $P(A^c \cap B) = P(B) - P(A \cap B)$

$P(A \cap B^c) = P(A) - P(A \cap B)$

b) Define mutually exclusive events. State and prove addition theorem for mutually exclusive events.

23. a) If A and B are independent, prove that A^c and B are independent.

b) A box has 8 red, 5 green and 10 blue balls. Two are drawn one after another . What is the probability that they are both green in case of

(i) drawn together
(ii) drawn one after another with replacement
(iii) drawn one after another without replacement

24. Prove that $V(aX) = a. V(X)$, $V(a) = 0$ and $V(aX+b) = a. V(X)$ for any discrete variable. If X is a discrete random variable taking values -20, -10 and 10 with equal probabilities, find V(50), V(6X) and V(3X+60) and V(80X).

CHRIST UNIVERSITY, BANGALORE-560029
I B.Sc End Semester Examination October 2011

Code: STA131

Sub:Basic Statistics & Probability

Max. Marks: 100
Duration: 3 Hrs

SECTION - A

Answer any 10 questions. **10 x 2 = 20**

1. Distinguish between population and sample
2. List any two advantages of primary data collection.
3. Distinguish between discrete and continuous variables
4. Give an example each for (i) nominal scale (ii) interval scale.
5. Twelve persons gambled on a certain night. Seven of them lost at an average rate of Rs. 1050 while the remaining five gained at an average of Rs. 1300. Is the information given above correct? Explain.
6. Write the formula for 7th order moment about the value 80 for a grouped data.
7. Give two examples for mutually exclusive events.
8. Define continuous random variable.
9. If $E(X) = 8$, find $E(9X)$, $E(2X+6)$.
10. State multiplication theorem of expectation.
11. If $V(X) = 8$, find $V(9X)$, $V(2X+6)$.
12. Define moment generating function.

SECTION - B

Answer any 4 questions. **4 x 6 = 24**

13. Explain various parts of a statistical table.
14. What are the properties of a good average? Examine these properties with reference to harmonic mean.
15. Explain various types of partition values. Give the formulae to calculate them in continuous distributions
16. a) A box contains 4 red and 3 green marbles. Another has 1 red and 2 green marbles. Two marbles are drawn at random from one of the boxes. What is the probability that (i) both are of the same colour? (ii) both are of different colour?
    b) What concept was used in the above question? Explain it briefly.
17. State and prove addition theorem of expectation for a discrete random variable.
18. Define moment generating function of a random variable X. Write the formula for moment generating function about arithmetic mean if X is i) discrete ii) continuous

SECTION - C

Answer any 4 questions. **4 x 14 = 56**

19. a. Explain different methods of primary data collection
    b. Describe the construction of percentage bar chart. Give an example.

20. a.Obtain the expression for combined mean and combined standard deviation.
    b.Write short notes on absolute and relative measures of dispersion.

21. a. Write short notes on moments. Explain the role of moments in studying the characteristics of a distribution.
    b. Prove that for any discrete distribution standard deviation is not less than mean deviation from mean.

22. a) Prove that $P(A^c \cap B) = P(B) - P(A \cap B)$

$$P(A \cap B^c) = P(A) - P(A \cap B)$$

    b) Define mutually exclusive events. State and prove addition theorem for mutually exclusive events.

23. a) If A and B are independent, prove that A^c and B are independent
    b) If odds of an event are 4:5, odds against another event are 5:6, find probability of
       i) at least 1 event occurring
       ii) both the events occurring
       iii) only first event occurs

24. Prove that $V(aX) = a^2 V(X)$, $V(a) = 0$ and $V(aX+b) = a^2 V(X)$ for any discrete variable. If X is a discrete random variable taking values 10, -10 and 30 with equal probabilities, find V(50), V(10X) and V(6X+25) and V(50X)

CHRIST UNIVERSITY, BANGALORE-560029

End Semester Examination - 2012

I Bachelor of Science

Code : STA131

Sub : BASIC STATISTICS & PROBABILITY THEORY

Max. Marks : 100

Duration : 3Hrs

SECTION A

Answer any TEN questions. Each question carries TWO marks 10 X 2 = 20

1 Define sample and give an example

2 Polls often conduct pre-election surveys by phone. Could this bias the result? Give reasons

3 To depict birth and death rates of two countries which is the suitable diagrammatic representation?

4 Define an attribute and give an example.

5 Twelve persons gambled on a certain night. Seven of them lost at an average rate of Rs. 1050 while the remaining five gained at an average of Rs. 1300. Is the information given above correct? Explain.

6 Define the term coefficient of variation.

7 What is an event? Given P (A) = ¾, find P (A^c).

8 A football team has a probability of 0.75 of winning when playing any of the other four team in its conference. If the games are independent what is the probability the team wins all the conference games?

9 Give two examples of continuous random variables.

10 If E(X) = 3, find E (3), E (9X).

11 If X is a continuous random variable give the formula to find r^{th} order central moment.

12 Write short notes on uniqueness property of mgf.

SECTION B

Answer any FOUR questions. Each question carries SIX marks 4 X 6 = 24

13 The daily high and low temperatures for 20 cities follow:

City	High	Low	City	High	Low
Athens	75	54	Melbourne	66	50
Bangkok	92	74	Montreal	64	52
Cairo	84	57	Paris	77	55
Copenhagen	64	39	Rio de Janeiro	80	61
Dublin	64	46	Rome	81	54
Havana	86	68	Seoul	64	50
Hong Kong	81	72	Singapore	90	75
Johannesburg	61	50	Sydney	68	55
London	73	48	Tokyo	79	59
Manila	93	75	Vancouver	57	43

(a) Prepare a stem and leaf display for the high temperatures and low temperatures. (b) Compare the stem and leaf displays from part (a) and make some comments about the difference daily high and low temperatures.

14 Define geometric mean. When do we use it? Obtain the expression for combined geometric mean of 2 sets of observations.

15 Write short notes on skewness and discuss various measures of skewness and their interpretations.

16 Prove that (i) if B is a subset of A, P (B) <=P (A) and (ii) P (A^c) = 1- P(A) where A is any event.

17 a. Define (i) probability density function (ii) probability mass function of a random variable

b. A supplier of kerosene has a 150 gallon tank that is filled at the beginning of each week. His weekly demand shows a relative frequency behavior that increases steadily up to 100 gallons and then levels off between 100 and 150 gallons. If Y denotes weekly demand in hundreds of gallons, the relative frequency of demand can be modeled by

$$f(y) = \begin{cases} y, & 0 \le y \le 1 \\ 1, & 1 < y \le 1.5 \\ 0, & elsewhere \end{cases}$$

Find F(y).

18 If X is a random variable and a is a constant, prove that E(aX) = a E(X) if i. X is discrete ii. if X is continuous.

SECTION C

Answer any FOUR questions. Each question carries FOURTEEN marks **4 X 14 = 56**

19 a. Explain different methods of primary data collection

b. Describe the construction of histogram and locating mode from that

20 a. Show that the standard deviation is independent of change of origin but not of scale.

b. State the properties of arithmetic mean.

21 a. Prove that for any discrete distribution standard deviation is not less than mean deviation from mean.

b. Express raw moments in terms of central moments.

22 a. State and prove addition theorem

b. Define mutually exclusive events. State and prove addition theorem for mutually exclusive events

23 a. If A and B are independent, prove that A^c and B are independent.

b. If odds of an event are 4:5, odds against another event are 5:6, find probability of i) at least 1 event occurring ii) both the events occurring iii) only first event occurs.

24 a. Let X be a continuous random variable with pdf $f_X(x)$. Let y=g(x) be strictly monotonic function of x. Assume that g(x) is differentiable and hence continuous for all x. Then what is the pdf of the random variable Y?

b. If the cumulative distribution function of X is F(x), find the cumulative distribution function of (i)Y=X-b (ii) Y=aX (iii) Y=X+a.

CHRIST UNIVERSITY, BANGALORE-560029

End Semester Examination October - 2013
CMS/EMS-I SEMESTER

Code : STA131-13 **Max. Marks : 100**
Sub : DESCRIPTIVE STATISTICS AND PROBABILITY THEORY **Duration : 3Hrs**

General Instructions : Question numbers and notations must be clearly written. Scientific calculators allowed

SECTION A

Answer any TEN questions **10 X 2 = 20**

1 List any two types of primary data collection.
2 Define bifold classification and give an example.
3 Write the formula for calculating 28^{th} percentile and 7^{th} decile in continuous frequency distribution.
4 The standard deviation of 10 observations is 2. Find the changed standard deviation if (i)each observation is increased by 4(ii)each observation is multiplied by 5?
5 Write the formula for calculating 28th percentile, explaining each term.
6 Define coefficient of determination.
7 State the two properties of regression coefficients.
8 State any two properties of residuals.
9 In a trivariate distribution, $\sigma_1=2$, $\sigma_2=\sigma_3=3$, $r_{12}=0.7$, $r_{23}=r_{31}=0.5$, find $R^2_{1.23}$.
10 Define independent event and give an example.
11 Define P(A/B) stating all notations correctly. A and B are any two events.
12 Find $P(A\cap B)$ if P(A)=1/2, P(B)=3/4 and A and B are mutually exclusive events.

SECTION B

Answer any **FOUR** questions **4 X 6 = 24**

13 Explain various types of classification giving suitable examples.

14 Define geometric mean. When do we use it? Obtain the expression for combined geometric mean of 2 sets of observations.

15 Write short notes on skewness. Also obtain the limits for Bowley's coefficient of skewness.

16 Derive the line of regression of X on Y.

17 Show that (i) $1-R^2_{1.23}=(1-r^2_{12})(1-r^2_{13.2})$ (ii) If $R_{1.23}=0, X_1$ is uncorrelated with any of the other variable.

18 A box contains 4 red and 3 green marbles. Another has 1 red and 2 green marbles. Two marbles are drawn at random from one of the boxes. What is the probability that

(i) both are of the same colour?

(ii) both are of different colour?

b) What concept was used in the above question? Explain it briefly.

SECTION C

Answer any **FOUR** questions **4 X 14 = 56**

19 a. Explain the procedure of framing a schedule.

b. Explain how the graphical representation of data can be used to locate averages

20 a) Show that the standard deviation is independent of change of origin but not of scale.

b) Let r be the range and s be the standard deviation of a set of n observations. Then prove that s≤r.

21 a)Define Spearman's rank correlation and derive the formula for computing the same.

b)Show that rank correlation coefficient lies between -1 and +1.

22 State and prove the properties of multiple correlation coefficients, after defining the same with examples.

23 a) If A, Band C are mutually independent, prove that AUB and C are also independent.

b) If A, B, C are pair wise independent and A is independent of BUC, then A, B and C are mutually independent.

c)If A and B are independent, prove that A^c and B are independent

24 a)State and prove Bayes theorem. What is it used for?

b) A machine manufactures 2% defectives. Another manufactures 1.5% defectives. An article is chosen from the manufactured common lot and is found to be defective. What is the probability that it came from machine 1?

CHRIST UNIVERSITY, BANGALORE-560029

End Semester Examination Sept / Oct - 2014

I Sem - BSc in CMS / EMS

Code : STA131

Sub : DESCRIPTIVE STATISTICS AND PROBABILITY THEORY

Max. Marks : 100

Duration : 3Hrs

General Instructions : Question numbers and notations must be clearly written. Scientific calculators allowed

SECTION A

Answer any TEN questions

10 X 2 = 20

1 Give an example each for

(i) nominal scale

(ii) interval scale.

2 Define captions and stubs.

3 List any two mathematical averages.

4 The mean weight of 150 students is 60 kgs. The mean weight of boys in the class is 70kgs and that of the girls is 55 kgs. Find the number of boys and girls.

5 Why do we consider the absolute deviations while calculating the mean deviation?

6 Define correlation ratio.

7 Define intra class correlation.

8 What will be the correlation coefficient when variables are varying:

(i) in the same direction?

(ii) independent?

9 Define partial correlation coefficient.

10 In a trivariate distribution, $\sigma_1=2$, $\sigma_2=\sigma_3=3$, $r_{12}=0.7$, $r_{23}=r_{31}=0.5$, find $R^2_{1.23}$.

11 Given P (A) = ¾, find P (A^c). Which formula is used to find this?

12 Define 'complementary events'.

SECTION B

Answer any FOUR questions

4 X 6 = 24

13 The daily high and low temperatures for 20 cities follow:

City	High	Low	City	High	Low
Athens	75	54	Melbourne	66	50
Bangkok	92	74	Montreal	64	52
Cairo	84	57	Paris	77	55
Copenhagen	64	39	Rio de Janeiro	80	61
Dublin	64	46	Rome	81	54
Havana	86	68	Seoul	64	50
Hong Kong	81	72	Singapore	90	75
Johannesburg	61	50	Sydney	68	55
London	73	48	Tokyo	79	59
Manila	93	75	Vancouver	57	43

(a) Prepare a stem and leaf display for the high temperatures and low temperatures. (b) Compare the stem and leaf displays from part (a) and make some comments about the difference daily high and low temperatures.

14 Define harmonic mean. When do we use it? Obtain the expression for combined harmonic mean of 2 sets of observations.

15 Write short notes on skewnessand kurtosis.

16 Derive the line of regression of X on Y.

17 Also show that $1-R^2_{1.23}=(1-r^2_{12})(1-r^2_{13.2})$. Also show that $R_{1.23}\geq r_{12}$.

18 a) In a city 60% read news paper A, 40% read news paper B and 30% read news paper C, 20% read A and B, 30% read A and C, 10% read B and C. Also 15 % read papers A, B and C. Find the percentage of people who do not read any of theses news papers.

b) Explain the concept used in (a).

SECTION C

Answer any FOUR questions **4 X 14 = 56**

19 a) Explain the procedure of framing a schedule.

b) Describe the construction of histogram and locating mode from that.

20 a) Explain the procedure of construction of a table.

b) Draw up a blank table to show the number of employees in a large commercial firm, classified according to (*i*) Sex: Male and Female; (*ii*) Three age-groups: below 30, 30 and above but below 45, 45 and above; and (*iii*) Four income-groups: below Rs. 400, Rs. 400–750, Rs. 750–1,000, above Rs.1000.

21 Express raw moments in terms of central moments and vice versa. What is the role of moments in studying the nature of a given frequency distribution?

22 a) Show that the sum of squared deviations is minimum when taken about mean.

b) Distinguish between absolute and relative measures of dispersion. Discuss various measures of absolute and relative measures of dispersion.

23 a) State and prove the properties of regression coefficients.

b) Write a short note on coefficient of determination.

24 a) In an office there are 70 people, of whom 40 are women. Among the women, 25 are graduates, and among men, 15 are graduates. A person is chosen at random What is the probability that it is:

(i) A man?

(ii) Graduate woman?

(iii) A graduate or a man?

(iv) A graduate man or a woman?

b) An urn contain 6 red, 3 black and 4 yellow marbles. If three marbles are drawn at random find the probability of choosing:

(i) all of the same colour

(ii) all of different colour

(iii) exactly two black.