# CHRIST UNIVERSITY, BANGALORE-560029

**End Semester Examination - 2012**

**I Bachelor of Science**

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

**Sub : BASIC STATISTICS & PROBABILITY THEORY** | **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.