



# BRAINWARE UNIVERSITY

Course – M.Com.

Statistics for Business Research (MCM104)

(Semester – 1)

Time allotted: 3 Hours

Full Marks: 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group –A

(Multiple Choice Type Question)

1. Choose the correct alternatives for the following: 10 x 1 = 10

i) Prosperity, Recession and depression in a business is an example of

- a) Cyclical Trend      b) Seasonal Trend      c) Irregular Trend      d) Secular Trend

ii) In normal distribution:

- a) Mean = Median = Mode    b) Mean < Median < Mode    c) Mean > Median > Mode    d) Mean ≠ Median ≠ Mode

iii) The sum of deviations about the mean is always

- a) zero                      b) range                      c) positive                      d) total standard deviation

iv) Which of the following is a method of selecting samples from a population?

- a) Judgement Sampling    b) Random Sampling    c) Probability Sampling    d) All of these

v) Which of the following is a necessary condition for using a t distribution table?

- a) n is small    b) s is known but  $\sigma$  is not    c) The population is finite    d) 'a' and 'b' correct

vi) If mean of 6 numbers is 41 then sum of these numbers is

- a) 250                      b) 246                      c) 134                      d) 456

vii) A weighted aggregate price index where the weight for each item is its base period quantity is called the

- a) Laspeyres Index                      b) Paasche Index                      c) Fisher's Index                      d) None of these

viii) When the null hypothesis is  $H_0: \mu = 42$ , the alternative hypothesis can be:

- a)  $H_1: \mu \geq 42$                       b)  $H_1: \mu < 42$                       c)  $H_1: \mu = 40$                       d)  $H_1: \mu \neq 40$

ix) In hypothesis testing, the appropriate probability distribution to use is always the normal distribution.

- a) True                      b) False

x) Secular trend can be measured by

- a) 2 methods                      b) 3 methods                      c) 5 methods                      d) 4 methods

### Group - B

#### (Short Answer Type Questions)

Answer any three of the following

**3 x 5 = 15**

2. Construct Fisher's ideal index number for the following data:

Commodity	2000		2010	
	Price	Quantity	Price	Quantity
A	8	6	12	5
B	10	5	11	6
C	7	8	8	5

3. State whether the correlation will be positive or negative in the following cases:                      [1x5]

- i) Age and Income
- ii) Speed of an automobile and the distance required to stop the car after applying breaks.
- iii) Sale of woolen garments and day temperature.
- iv) Sale of cold drinks and day-temperature
- v) Shoe size and intelligence.

4. From a population of 125 items with a mean of 105 and a standard deviation of 17, 64 items were chosen. What is the standard error of the mean?
5. Describe the trade - off between Type I error and Type II error?
6. Compute S.D from the following:

x	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
f	5	12	15	20	18	10	6	4

**Group - C**

**(Long Answer Type Questions)**

**Answer any three of the following**

**3 x 15 = 45**

7. The heights (in centimeters) and weight (in kilograms) of 10 basketball players on a team are:

Height (X)	186	189	190	192	193	193	198	201	203	205
Weight (Y)	85	85	86	90	87	91	93	103	100	101

Calculate:

- The regression line of x on y.
- The coefficient of correlation.
- The estimated height of a player who has the weight of 102 kgs.

[7+5+3]

8. a) In the following frequency distribution two class frequencies are missing:

Intelligence Quotient	No of students
55-64	2
65-74	19
75-84	78
85-94	?
95-104	301
105-114	?
115-124	92
125-134	14
135-144	4

It is however known that the total frequency is 900 and the median 100.048. Find the two missing frequencies.

b) The average marks obtained in an examination by two groups of students was found to be 75 and 85 respectively. Determine the ratio of students in the two groups, if the average mark for all students was 80.

c) What is the relation between mean, median and mode? [8+5+2=15]

9. a) A noted psychologist surveyed 150 top executives and found that 42% of them were unable to add fractions correctly. Construct a 95% confidence interval for the true proportion of top executives who cannot correctly add fractions. ( $Z$  value for 95% confidence interval is 1.96).

b) A brand manager is concerned that her brand's share may be unevenly distributed throughout the country. In a survey in which the country was divided into four geographic regions, a random sampling of 100 consumers in each region was surveyed, with the following results:

Motive	NE	NW	SE	SW	Total
Purchase the Brand	40	55	45	50	190
Do not Purchase	60	45	55	50	210
Total	100	100	100	100	400

At  $\alpha = 0.05$ , test whether brand share is the same across the four regions. ( $\chi^2$  value at  $\alpha = 0.05$  is 7.815) [5 + 10]

10. a) Which of the following probability distribution is most likely the appropriate one to use for the following variables: Binomial, Poisson or Normal

i) Life span of a female born in 1977

ii) The number of autos passing through the a tollbooth

iii) The number of defective radios in a lot of 100

iv) Average rainfall in a month

v) Tossing of a coin

b) Describe the characteristics of a normal distribution.

c) The manager of Cardinal Electric's light bulb division must estimate the average number of hours that a light bulb made by each light bulb machine will last. A sample of 40 light bulbs was selected from a machine A and the average burning time was 1416 hours. The standard deviation of burning time is known to be 30 hours. Construct a 90% confidence interval for the true population mean. (Z value for 90% confidence interval is 1.64)

[5 + 5 + 5]

11. a) Write the steps involved in hypothesis testing.

b) A random sample of 400 containers is found to have a mean weight of 82 kg and standard deviation of 18 kg. Find 95% confidence limits for the mean of the population from which the sample is drawn (Value of z for 95% confidence interval is 1.96).

c) A store owner sells drilling machine in his store and he is interested in comparing the reliability of the drilling machine he sells with the reliability of it sold nationwide. He knows that only 15% of all machine sold nationwide require repairs during the first year of ownership. A sample of 120 customers revealed that exactly 22 of them required to repairs in the first year ownership. At the 0.02 level of significance, is there evidence that the machine differ in reliability from those sold nationwide? (Z value for .02 confidence interval is 2.33).

[ 5 + 5 + 5]