



De Masenod College, Kandana  
Business Statistics – I  
Grade 13  
Third Term Test

18 JUL 2019

Time : 1 hour



- Answer all questions
- Select the most appropriate answer.

01) Which of the following statements is true?

- 1) The purpose of statistics is obtaining summarized measures.
- 2) Always statistics makes decisions by studying samples.
- 3) Inability of studying qualitative data is a limitation in statistics.
- 4) There is no possibility of obtaining sufficient and fair samples in statistical studies.
- 5) Statistics can be considered as a subject which studies variables.

02) Consider following statements

- A. Rank scales can be used for categorizing data
- B. There is no a true <sup>zero</sup> for ratio scale
- C. All mathematical operations can be done for interval scale data.

Which of the following statements is / are true ?

- 1) A only      2) B only      3) C only      4) A and B only      5) A, B and C all

03) Which of the following statements is true?

- 1) Literacy of people is influenced on the success of personal interview method.
- 2) In focus group method, study is conducted by the persons who have specialized knowledge in the relevant field.
- 3) High response rate can be expected in computer assisted self interview method.
- 4) Reliability of data can be confirmed through telephone conversation method.
- 5) In self enumeration method, relative cost of collecting data is high.

04) Most appropriate chart to present the variation in components of a variable is,

- 1) Simple bar chart
- 2) Multiple bar chart
- 3) Pie chart
- 4) Z chart
- 5) Linear graphs

05) Which of the following statements is not true ?

- 1) Skewness of a distribution can be identified by using an ogive.
- 2) Histogram can be constructed even the class widths are not equal.
- 3) Nature of a distribution can be identified by the stem and leaf diagram.
- 4) Measuring only the disparity in income distribution is the purpose of constructing a Lorenze curve
- 5) Using z curve short term variations can be identified.

06) The best measure which can be confirmed the reliability of central tendency in a set of data is,

- 1) Mode                      2) Median                      3) Mean  
4) Standard Deviation      5) Coefficient of variation

07) If a person spent similar amount to buy two varieties of mangoes which sell 4 for Rs. 100 and five for Rs. 100. What is the average price he spent for purchasing a mango?

- 1) Rs. 22.00      2)Rs. 22.22      3)Rs. 22.25      4)Rs. 24      5)Rs. 23

08) Consider following statements

- A. Quartiles can be obtained by the ogive.  
B. Frequency polygon cannot be constructed when class intervals are not equal.  
C. In box and whisker diagram, whiskers cannot go beyond outer boundaries.

- 1) A only      2) B only      3) C only      4) A and C only      5) B and C only

09) When considering total area of square in a Lorenze curve as 200 units and area in between equi-distributed line and curve as 80 units, the value of Gini coefficient is,

- 1) 0.2      2) 0.4      3) 0.8      4) 1.6      5) 4

10) The measure which is calculated by  $\frac{P_{75} + P_{25} - 2P_{50}}{P_{75} - P_{25}}$  is,

- 1) Karl Pearson's measure of skewness 1  
2) Karl Pearson's measure of skewness 2  
3) Bowley's measure of skewness  
4) Kelley's coefficient of skewness  
5) Measure of Kurtosis.

11) Geometric mean of three numbers is 25. If two numbers out of these numbers are 5 and 125, value of the other number is,

- 1) 20      2) 25      3) 40      4) 50      5) 60

12) Following measures were obtained when calculating regression line of Y on X.

$$\Sigma y = 150 \quad \Sigma x = 30 \quad \hat{a} = 7.5 \quad \hat{b} = 2.5$$

The number of bi-variable data used for above calculation is,

- 1) 5      2) 8      3) 9      4) 10      5) 12

13) Which of the following statements is true about multiple linear regression model ?

- A. Nonlinear relationships between two variables can be presented.  
B. Effect created by more than two variables on another variable can be studied.  
C. Able to study the effect created by more than one variable on another variable.

- 1) A only      2) B only      3) C only      4) B and C only      5) A, B and C

14) Which of the following statements is false ?

- 1) Coefficient of determinant is an absolute measure.  
2) The mark of coefficient of correlation and coefficient of regression are equal.  
3) If coefficient of determinant is 0.81, value of coefficient of correlation is 0.9  
4) For dependent variable, mean of observed values and mean of expected values are equal.  
5) Always the value of coefficient of correlation of x on y and coefficient of correlation of y on x are equal.

15) A and B are two independent events such that  $P(A) = P_1$  and  $P(B) = P_2$ . the probability of occurring only one event is,

- 1)  $P_1P_2$       2)  $P_1 - P_2$       3)  $P_2 - P_1$       4)  $P_1 + P_2 - P_1P_2$       5)  $P_1 + P_2 - 2P_1P_2$

16) If A and B are mutually exclusive events, the value of  $P(A^c | B)$  is,

- 1) 0      2)  $\frac{1}{2}$       3) 1      4)  $P(A) / P(B)$       5)  $P(B) / P(A)$

17) If A and B are two events such that  $P(A) = \frac{3}{4}$ ,  $P(B) = \frac{1}{2}$  and  $P(A^c \cup B^c) = \frac{3}{4}$ , A and B events are,

- 1) Mutually exclusive      2) Independent  
3) Equally likely      4) Certain      5) Exhaustive

18) Consider following statements

P - Some time two independent events which are not null events can be mutually exclusive.

Q - Probability of occurring event A when event B is given is always greater than probability of occurring A.

R - If  $B \subset A$ , the probability of  $P(A/B)$  is 1.

Which of the above statements is/are true?

- 1) P only      2) Q only      3) R only      4) P and R only      5) P, Q and R

19) If x can take only values 0, 1, 2 and 3 which of following function can be considered as a probability function?

- 1)  $f(x) = \frac{x}{8}$       2)  $f(x) = \frac{x-1}{2}$       3)  $f(x) = \frac{x+2}{4}$       4)  $f(x) = \frac{x+1}{10}$       5)  $\frac{x^2}{6}$

x	-2	-1	0	1	2
P(x)	0.1	a	0.25	b	0.05

Expected value of above probability distribution is 0.1 values of a and b are,

- 1) 0.1, 0.5      2) 0.15, 0.45      3) 0.3, 0.3      4) 0.2, 0.4      5) 0.5, 0.1

21) Mean value of a poisson distribution with  $2P(x=2) = P(x=3)$  is,

- 1) 1      2) 2      3) 3      4) 5      5) 6

22) In a tournament with five matches in between A and B teams, the probability of winning team A is equal to the two of probability of winning team B. the probability of winning at least one match by team A is,

- 1)  $\frac{242}{243}$       2)  $\frac{211}{243}$       3)  $\frac{128}{243}$       4)  $\frac{32}{243}$       5)  $\frac{1}{243}$

23) Life time of a certain type of battery is normally distributed with mean 400 hours and standard deviation 40 hours. After how many hours 10% of the bulbs will burn?

- 1) 333.4      2) 348.8      3) 420.8      4) 451.2      5) 456.6





24) Which of the following statements is true?

- 1) Variance of sampling with replacement is lesser than variance of sampling without replacement
- 2) Purpose of sampling is making decisions by studying whole rather than making decisions by studying individual items.
- 3) A sampling unit means a population element selected for the sample.
- 4) The population is considered as infinite when sample size is very small relative to population size is very small relative to population size.
- 5) The results which valid for sampled population are not always valid for target population also.

25) Which of the following factor can be reduced by increasing sample size?

- A. Width of the confidence interval
  - B. Accuracy of the results
  - C. Population variance
- 1) A only                      2) B only                      3) C only                      4) A and B only                      5) A and C only

26) Which of the following statements is true ?

- 1) Precision of simple random sampling is higher than other probabilistic sampling methods.
- 2) Cluster sampling is differ from stratified sampling due to not using a sampling frame.
- 3) Circular systematic sampling is used when sampling fraction is not a whole number.
- 4) In purposive sampling, sample is selected by specialized persons.
- 5) In stratified sampling variation between strata should be high.

27) Size of a population is 256 and its variance is 51. When randomly selects a sample with size 36 from this population, the standard error of sampling distribution of sample mean is,

- 1)  $\frac{51}{36}$
- 2)  $\frac{\sqrt{51}}{6}$
- 3)  $\frac{\sqrt{11}}{3}$
- 4)  $\frac{51}{\sqrt{255}}$
- 5)  $\frac{51}{6}$

28) It has been confirmed that 80% of university students use internet facilities for their studies. If randomly selected a sample of 400 students, find the probability of using internet facilities by more than 336 students ?

- 1) 0.3413                      2) 0.1587                      3) 0.4772                      4) 0.0228                      5) 0.0668

29) Number of daily sales of mobile phones in a shop follows a normal distribution with mean 25. The probability that mean number of mobile phones sold in randomly selected 100 days is not more than 26 is ?

- 1) 0.1587                      2) 0.3413                      3) 0.8413                      4) 0.4772                      5) 0.9772

30) Which of following statements is / are true?

- A. An estimator means a value which is computed by using elements of a sample which is use to estimate the value for a population parameter.
- B. Value of the t distribution with degrees of freedom is  $K - 1$  is greater than the value of t distribution with degrees of freedom  $K$ .
- C. t distribution is used in interval estimation for population mean when variance of a normal distribution is unknown.

1) A only    2) B only    3) C only    4) B and C only    5) A, B and C all

31) Mean of a sample of size 16 which is randomly drawn from a population of  $N(\mu, 64)$  is 50. Upper limit in interval estimation for population mean under 95% confidence level is,

1) 54.26    2) 53.5    3) 53.92    4) 53.28    5) 55.96

32) Which of the following statements is/are true ?

- A. If confidence level is high precision of estimator is high.
- B. The difference in between the value of estimate and parameter is called precision.
- C. Efficiency of estimator and variance are indirectly proportional.

1) A only    2) B only    3) C only    4) A and B only    5) A and C only

33)  $\bar{x}$  is the mean of a sample of size  $n$  which is drawn from the population  $N(\mu_1, \sigma^2)$  and  $\bar{y}$  is the mean of a sample of size  $n$  which is drawn from the population  $(\mu_2, \sigma^2)$

and  $P[\bar{x} - \bar{y} - \frac{\sigma}{5} < \mu_1 - \mu_2 < \bar{x} - \bar{y} + \frac{\sigma}{5}] = 0.95$ . The value of  $n$  is,

1) 48    2) 62    3) 97    4) 102    5) 192

34) Which of the following statements is true about Hypothesis test.

- A. Probability of rejecting null hypothesis is received through significance level.
- B. Accepting accurate alternative hypothesis is called power of the test.
- C. Type I error and type II error can be occurred at once.

1) A only    2) B only    3) C only    4) A and B only    5) A and C only

35) Manufacturing company says that tubes which are used for special type of electric bulb is produced with length of 20 cm. hypothesizes that should be constructed to test this is,

1)  $H_0 : \mu = 20$     2)  $H_0 : \mu = 20$     3)  $H_0 : \mu = 20$     4)  $H_0 : \mu \leq 20$     5)  $H_0 : \mu \geq 20$   
1)  $H_1 : \mu < 20$     2)  $H_1 : \mu > 20$     3)  $H_1 : \mu \neq 20$     4)  $H_1 : \mu > 20$     5)  $H_1 : \mu < 20$

36) In hypothesis testing for population proportion, which of following factor is not effected through increasing sample size by two times.

1) Test statistic    2) Critical value    3) Type I error  
4) Power of the test    5) Conclusion

37) When testing Hypothesis of  $H_0 : \mu = 150$  against Hypothesis  $H_1 : \mu = 155$ , critical area decided as  $\bar{x} \geq 53.2$ . when population variance is given as 256 if the test is conducted by using samples of size 64, the value of  $p$  is,

1) 0.2881    2) 0.2119    3) 0.4452    4) 0.0548    5) 0.0668

38) When testing whether a dice is fair, dice is thrown in 120 times and number of times each value received, obtained as 16, 23, 18, 24, 22, 17. The value of test statistic is,

1) 58    2) 18    3) 2.9    4) 1.8    5) 0.9

- 39) Which of the following statement is true about Analysis of variance.
- Used for testing whether few population means are equal at once.
  - Used for testing whether few population proportions are equal at once.
  - Test statistic is calculated by considering variance between samples and variance within samples.
- 1) A only    2) B only    3) C only    4) A and C only    5) A,B and C all
- 40) Which of the following is not a cause for seasonal variation in time series analysis?
- Christmas
  - Sunday holiday
  - Weather changes
  - Cold season
  - School vacation
- 41) Annual trend line with origin 2015 is given as  $y = 280 + 25.6x$ . The estimated value for second quarter of year 2017 is.
- 1) 83.6    2) 82    3) 80.4    4) 78.8    5) 77.2
- 42) Which of the following statements is true ?
- Seasonal variations may exist in annual data
  - In order to obtain original data, deseasonalized data should be divided by seasonal index and multiple by 100
  - Cyclical variations cannot be forecasted in a time series.
  - Trend line can be obtained through semi average method even there is no a linear trend .
  - No need to study the nature of the time series when using least squares method.
- 43) Which of the following statements is true ?
- Price change is clearly shown by Paasche's price index.
  - Changes in living pattern of people is influenced on an index.
  - The reason for selecting a typical period index is that both current year and base year are not economically stable.
- 1) A only    2) B only    3) C only    4) A and B only    5) B and C only
- 44) Which of the following statement is true about MarchellEdgeworth price index?
- Considers mean of Laspeyre's and Paasche's price indices.
  - Considers geometric mean of Laspeyre's and Paasche's price indices
  - Weighted by average of prices in base year and current year.
  - Weighted by average of quantities in base year and current year.
  - Weighted by quantity change in base year and current year.
- 45) When group index of food is 180, group index of other items is 120 and overall index is 144, percentage of weight allocated for food is,
- 1) 80%    2) 70%    3) 60%    4) 50%    5) 40%
- 46) In between year 1990 and 2015 income increment index was 480 and price changes was 160. Population change index was 120. Increment in per capita real income was,
- 1) 400    2) 320    3) 300    4) 280    5) 250

- 47) In a certain production process milk packets are packed according to assigned standards as mean weight of milk packet 400 g and standard deviation 4 g. The upper control limit of a mean chart which is constructed by selecting samples of size 4 is,
- 1) 406      2) 408      3) 410      4) 412      5) 416
- 48) Control chart which is use to check number of flaws in a certain type of fabric by selecting 10 pieces with length 100 cm is,
- 1) p chart    2) np chart    3) R chart    4) C chart    5) U chart
- 49) The reason which is not cause for the preparation in overall system is,
- 1) Defective raw material  
2) Wear and tear in machinery  
3) Wrong setup in machineries  
4) Heat in machines  
5) Unskilled workers
- 50) In an acceptance sampling plan  $AQL = 0.008$   $LTPD = 0.08$  and acceptance number is 2. If 125 units are used at a time, the producer's risk is,
- 1) 0.02      2) 0.05      3) 0.08      4) 0.95      5) 0.92





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 Business Statistics – II  
 Grade 13  
 Third Term Test  
 17 JUL 2019



Time : 3 hours

- Answer 5 questions selecting at least two questions from each part

**Part I**

01).

- Explain computer assisted personal interview method and state merits and demerits of that method. (04 marks)
- What is the function of pilot survey in data collection? (03 marks)
- Following measures were received about marks of students for Economics, Accounting, Business statistics in a term test

	Economics	Accounting	Business Stat.
Minimum value	22	28	32
Maximum value	87	94	90
First Quartile	44	46	48
Median	52	64	62
Third Quartile	66	72	74

Construct box and whisker diagram on the same graph and state your idea about marks distribution. (07 marks)

- Following table provides cumulative totals and annual moving totals about monthly sales of a certain company for year 2016.

Year	Jan	Feb	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec
Cumulative Value	46	70	108	178	236	280	316	358	408	466	530	614
Annual Moving totals	436	442	456	478	498	510	522	536	552	570	590	614

(06 marks)

02).

- Define simple arithmetic mean, weighted mean geometric mean and harmonic mean separately with one practical example for each (06 marks)
- State the function of skewness and kurtosis when deciding the nature of a distribution. Information about weights of 50 students are given below.

Weight (kg) :	35-39	40-44	45-49	50-54	55-59	60-64	65-69
No. of students :	3	5	8	12	10	7	5

Compute  $Q_1$ ,  $Q_2$ ,  $Q_3$ ,  $P_{10}$  and  $P_{90}$  for students weight and compute an appropriate measure of skewness and measure of kurtosis and explain nature of the distribution (08 marks)



c) Information about daily wages of employees in A and B companies are given below

Wage :	less than 200	200-400	400-600	600-800	800-1000
No of employees in Company A	5	8	12	15	10
No. of employees In company B	3	9	15	13	10

Which company is having high variations in wage distribution

(06 marks)

03)

a) What is mean by weights when constructing an index?

State the importance of it?

(03 marks)

b) Indices and expenses percentages of 5 categories in year 2015 and 2016 are given below;

Category	2015 price Index	2016 price Index	Expenses percentage
Food	160	200	40
Housing	120	150	15
Clothing	140	175	10
Transportation	150	180	15
Other	125	150	20

Construct cost of living index of year 2016 with compared to year 2015.

(06 marks)

c) What are the adjustments that should be made before time series analysis?

(03 marks)

d) Production information (Rs. Thousands) of a company for last eight years as follows.

Year	2010	2011	2012	2013	2014	2015	2016	2017
Production	30	48	45	55	62	75	72	83

Obtain trend line under least squares method and estimate expected production for year 2020

(07 marks)

04).

a) Explain the difference between product moment coefficient of correlation and rank correlation coefficient.

Mention qualities of product moment correlation coefficient.

(04 marks)

b) Promotional expenses of a certain company during last 6 months (Rs. Thousands) and profit (Rs. Million) are given below.

Month	Jan.	Feb.	Mar.	Apr.	May	June
Promotional Expenses (X) (Rs. Thousands)	8	6	12	15	10	9
Profit (Y) (Rs. Million)	20	15	30	50	25	20

- i. Obtain least squares regression line to present relationship between promotional expenses and profit.
- ii. Test the validity of your regression line with regard to above data
- iii. Estimate the expected profit when promotional expenses is Rs. 14 000.  
 $[\Sigma x = 60, \Sigma y = 210, \Sigma xy = 1790, \Sigma x^2 = 650, \Sigma y^2 = 5050]$  (06 marks)

- c) State the advantages that can be obtained by statistical quality control for a company . (04 marks)
- d) An acceptance sampling plan is prepared by selecting a sample of size 50 in order to accept the lot when defective units are less than two. Compute the probability of acceptance when defective percentages are 1% , 2% ,4% ,6% ,8% and 10% .  
 Draw the OC curve using above data and mention your idea on it. (06 marks)

### Part II

05).

- a) State, relative frequency approach and mention its limits (05 marks)
- b) Explain, how conditional probability become important in business field. (03 marks)
- c) If A and B are two events such that  $P(A/B) = 3/2$  and  $P(B/A) = 3/8$  and  $P(A)+P(B) = 1$  ,  
 Obtain the value of P (A). (05 marks)
- d) A sales man sells three types of items called A,B and C. In some day probability of selling item A is 60%, probability of selling item B is 70% and probability of selling item C is 80% .compute probability of selling at least one item in a randomly selected day. (04 marks)
- e) It has reported that 40% of females above 60 years suffer from diabetic. When test is conducted for diabetic patients, test confirms that patients suffer from diabetic with 95% accuracy when they actually suffer from diabetic and test confirms that patients do not suffer from diabetic with 98% accuracy when they actually do not suffer from diabetic. If a test is done for a female above 60 years and if test confirms that patient is suffer from diabetic, what is the probability that she actually suffer from diabetic? (05 marks)

06).

- a) What is meant by a probability distribution ?  
 What are the conditions that should be satisfied by a probability distribution? (04 marks)
- b) There are 4 defective units in a sample of 12 units. If three units are randomly selected from this sample, by considering X as number of defective units.  
 Write the probability distribution of X and find the expected number of defective units. (05 marks)
- c) Probability of selling a certain type of lottery during a day is 10%.
  - i. If a sales person has 10 lotteries to sell, find the probability that number of unsold lotteries during a day is less than three.
  - ii. If a sales person has 250 lotteries, find the probability that number unsold lotteries during a day is less than 20 (05 marks)

- d) Weight of an elevator is 1 000 kg. weight of persons who use the lift is normally distributed with mean 60 and standard deviation 10 kg. When two persons are going by the elevator, find the probability that total weight of lift exceeds 1500kg. (06 marks)

07).

- a) Explain, simple random sampling and systematic sampling and compare those two sampling methods (05 marks)
- b) As a probabilistic sampling method, compare purposive sampling and state two situations where this method can be used practically (03 marks)
- c) Consider the population {2 ,4 ,6} select random samples of size 2  
 i. With replacement  
 ii. Without replacement  
 And obtain variance of sampling distribution of sample mean.  
 State which sampling method is more appropriate? (07 marks)
- d) If random sample of size 54 is drawn from a Poisson distribution with  $\lambda = 6$  , find the probability that sample mean exceeds 5. (05 marks)

08).

- a) Out of pool of 1000 sportsmen , 100 sportsmen were randomly selected and their mean weight was reported as 65 and standard deviation was reported as 8 kg.  
 i. Obtain an estimate for mean weight of sportsman in the pool and calculate its standard deviation.  
 ii. Use above data to test the statement that average weight of a sportsman is 66 kg  
 iii. Obtain the estimate for total weight of all sportsmen in the pool and obtain its standard error. (09 marks)
- b) What is meant by consistency in an unbiased estimator ?  
 If an estimator is biased, can it be a consistent one ? (03 marks)
- c) Number of units sold by three sales executives during five week days are given below (Rs. hundred)

	Sales Executive		
	A	B	C
Monday	12	10	12
Tuesday	7	8	8
Wednesday	8	9	10
Thursday	5	6	7
Friday	8	9	8

- i. Test whether average sales level of these sales executives are equal at 0.05 level.  
 ii. If all data are in original form what is the effect created on the test. (08 marks)