De Mazenod College- Kandana

Business Statistics

1st Term Test | Grade 13 | Time : 02hours

Paper I

29 · 11 · 2016

Answer all questions

Select most appropriate answer.

1. Which of the following statements is true?
   (1) Main purpose of statistics is analysis of a data series.
   (2) Ability of making conclusions by studying single unit of a set of data is an advantage of statistics.
   (3) Statistical conclusions are relatively accurate.
   (4) Inability of making decisions at uncertainties is a limitation in statistics.
   (5) Qualitative data cannot be studied in statistical studies.

2. Which of the following statements is true?
   (1) When financially burden personal interview method is used to collect data.
   (2) It is compulsory to include two choice, multiple choice and free answer questions in a questionnaire.
   (3) Questionnaire is used in telephone conversation method.
   (4) Under personal interview method there is more chance to receive information which are not relevant for the purpose of survey.
   (5) Suitability of questionnaire can be tested by pretesting.

3. Which of the following statements is false?
   (1) Uniqueness of data get affected in ungrouped frequency distribution.
   (2) Pie chart clearly presents the relative importance of components of a variable.
   (3) All information in a set of data cannot be presented by a table.
   (4) If a variable uniformly distributed compared to another variable, Distribution of that variable can be presented by a straight line.
   (5) Pie chat and percentile component bar chart present same idea.

4. Consider the following statements.
   A: Quartiles, declies and percentiles can be obtained by an ogive.
   B: In a negatively skewed distribution, number of observations which are greater than mean is high than the number of observations which are less than mean.
   C: Short term fluctuations are presented by annual moving totals of a Z-curve.
   Which of the above statements are true?
   (1) A only
   (2) B only
   (3) A and B only
   (4) B and C only
   (5) A, B and C

5. Most appropriate chart to present composition of export income of tea, coconut, rubber for few years is.
   (1) Simple bar chart
   (2) Component bar chart
   (3) Multiple bar chart
   (4) Pie chart
   (5) Simple line graph.

6. Which of the following statements is true about moderately skewed distribution?
   (1) $\bar{X}$-Md=3($\bar{X}$-Mo)
   (2) $\bar{X}$-Mo=3Md
   (3) $\bar{X}$+2Md=Mo
   (4) 3Md+2$\bar{X}$=Mo
   (5) 2$\bar{X}$=3Md-Mo

7. Mean of a data series with 10 values is 60. After adding one data to that series mean increased up to 62. If another data added to obtain first mean value, that value is,
   (1) 82 (3) 60 (5) 38
   (2) 72 (4) 45

8. Mean of a data series with 50 values is 50. 10 is added to each first 20 values .5 is added to each second 20 values and 4 is subtracted from each remaining 10 values. New mean of data series is,
   (1) 55.2 (3) 53.4 (5) 51.8
   (2) 54.8 (4) 52.6

9. Geometric mean of 4,16,64 is,
   (1) 28 (3) 18.2 (5) 15.4
   (2) 24 (4) 16

10. Mean marks of students in a certain class is 53.5 Mean marks of 50 boys is 52. Mean marks of girls is 56. Total number of students in the class is,
    (1) 30 (3) 50 (5) 80
    (2) 40 (4) 60

11. coefficient of kurtosis in a normal distribution is,
    (1) 0.263 (4) 0.2
    (2) 0.5 (5) 0.29
    (3) 0.25

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12. Total value of data series with 10 items is 200. Summation of squared values is 6250. Coefficient of variation in this data series is,

(1) 75 (3) 50 (5) 15

(2) 60 (4) 25

13. Consider the following statements.

A: If coefficient of regression of Y on X is b_1 and if coefficient of regression of X on Y is b_2, then coefficient of correlation can be obtained by $b_1 x b_2$.

B: Fraction of independent variable out of dependent variable is called coefficient of determinant.

C: Amount change in X with respect to increment in one unit of Y is called coefficient of regression.

Which of above statements is true?

(1) A only (4) B and C only

(2) B only (5) A, B and C

(3) C only

14. Out of total variations, 36% is presented by errors. The value of coefficient of correlation is,

(1) 0.36 (3) 0.64 (5) 0.72

(2) 0.6 (4) -0.8

15. Select false statement about regression line of Y=40-0.2X

(1) There is a weak correlation between two variables.

(2) Two variables are inversely correlated.

(3) Regression line goes on the point of (10,38)

(4) Regression line intersect Y axis at point (0,40)

(5) Y decreased with respect of increment in X.

16. Consider the following statements about probability approaches.

A: When the result of a random experiment is infinite, Classical approach can be used.

B: In relative frequency approach random experiments should be done with equal condition.

C: Subjective approach provides probability value which is based on personal belief.

Which of the above statements is/are true?

(1) A only (3) C only (5) A,B and C

(2) B only (4) B and C only

17. Select the false statement when A and B are two mutually exclusive events.

(1) $P(A \cap B)=P(A)$ (4) $P(A \cap B)=P(A).P(B)$

(2) $P(A \cup B)=P(A)+P(B)$ (5) $P(B/A)=1$

(3) $P(A/B)=0$

18. If A and B are any two events such that P (A)=2/5, P(B)=1/4 and P(A $\cup$ B)=1/2. The value of P(A$\cap$B) is,

(1) 3/10

(2) 1/20

(3) 3/20

(4) 1/5

(5) 5/20

19. A and B are two independent events such that P(A) < P(B) and P (A$\cap$B)=6/25. The value of P(A) is,

(1) 2/5 (3) 2/25 (5) 1/10

(2) 3/25 (4) 3/5

20. Consider the following probability distribution,

X	:	0	1	2	3	4
P(X)	:	0.25	a	b	0.15	0.3

If expected value of this distribution is 1.65, the value of a and b are,

(1) 0.15,0.15 (3) 0.05,0.25 (5) 0.25,0.1

(2) 0.1,0.2 (4) 0.15,0.2

21. Expected value of X is 0.8 and variance is 1.6 Expected value of Y is 1.2 and variance is 2. Expected value and variance of 2X-Y are,

(1) 0.4, 2.8 (3) 0.4, 8.8 (5) 2.8, 8.8

(2) 0.4, 6.8 (4) 2.8, 2.8

22. Parameters of a binomial distribution with mean 6 and variance 4.8 are,

(1) (24, 0.8) (3) (16, 0.8) (5) (6, 0.8)

(2) (24, 0.2) (4) (16, 0.2)

23. Mean value of a poisson distribution with P(X=2)=3P(X=3) is,

(1) λ=6 (3) λ=2 (5) λ=1

(2) λ=3 (4) λ=1.5

24. P(X >Z_0)=0.95 The value of Z_0 is,

(1) 1.64 (3) 1.28 (5) -1.64

(2) 1.96 (4) -1.96

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25. Formula which is used to convert value of a normal variable with X N(20,64) into a standard normal variable is,

(1) $Z=\frac{X-64}{20}$

(2) $Z=\frac{X-20}{64}$

(3) $Z=\frac{X-64}{10}$

(4) $Z=\frac{X-20}{8}$

(5) $Z=\frac{X-20}{16}$

26. Which of the following statements is true?

(1) List of all sample units is called a sampling frame.

(2) Number of samples with size n that can be selected from a population of size N without replacement is N^n.

(3) In a sampling process with replacement, even though the population is finite it is considered as infinite.

(4) Value of sampling fraction is received by N/n

(5) Variance of a sample with replacement is less than variance of a sample without replacement.

27. When the population items are in an order, the most appropriate sampling method is,

(1) Simple random sampling

(2) Systematic sampling

(3) Stratified sampling

(4) Cluster sampling

(5) Quota sampling

28. Sampling method which is commonly used in consumer surveys is,

(1) Simple random sampling

(2) Systematic sampling

(3) Cluster sampling

(4) Quota sampling

(5) Judgment sampling

29. Consider the following statements

A: Quota sampling is a mixture of probability sampling and non probability sampling methods.

B: A sampling frame is not needed in judgment sampling.

C: When the population is inhomogeneous, stratified sampling method is more appropriate.

Which of the following statements is true?

(1) A, B and C

(2) A and C

(3) B and C

(4) B only

(5) C only

30. A reason for occurring sampling errors is,
    (1) Not meeting selected units
    (2) Not responding selected units
    (3) Not including all the units of population in sampling frame
    (4) Mistakes happed in coping data
    (5) Personal bias in enumerators.

31. When the population is normal , sampling distribution of sample mean
    (1) Normally distributed
    (2) Approximately normally distributed
    (3) Approximately normally distributed only if sample size is large
    (4) Nature of the distribution vary according to the nature of the population.
    (5) Normally distributed with having mean equal to population mean.

32. If a sample of size 36 is selected from a population of size 100 with mean 24 and standard deviation 33, variance of the sampling distribution of sample mean is,
    (1) 1/4
    (2) 3/2
    (3) 1/3
    (4) 16/297
    (5) 16/99

33. If a sample of size 36 is selected from a poisson distribution with λ=6, The sampling distribution of sample mean is,
    (1) Normally distributed with mean 6 and variance 6.
    (2) Approximately normally distributed with mean 6 and variance 6.
    (3) Normally distributed with mean 6 and variance 1/6.
    (4) Approximately normally distributed with mean 6 and variance 1/6
    (5) Normally distributed with mean 6 and variance 1.

34. If a sample of size 100is selected, highest variance in sampling distribution of sample proportion is received,
    (1) When π=0.9
    (2) When π=0.8
    (3) When π=0.7
    (4) When π=0.6
    (5) When π=0.5

35. Biased estimator to become consistent estimator,
    (1) Variance should equal to zero
    (2) When sample size become large, variance should approach zero.
    (3) Biasness should approach zero.
    (4) When increasing sample size, variance and biasness should approach zero.
    (5) Should have least variance.

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36. For an interval estimation of 80%, the value of coefficient of confidence according to standard normal distribution is.

(1) 1.96 (3) 2.05 (5) 1.28
(2) 1.64 (4) 1.81

37. Which of the following statement is true?

(1) Sample standard deviation $S=\sqrt{\frac{\Sigma(X-\bar{X})^2}{n-1}}$ is an unbiased estimator for population standard deviation.

(2) Sample median is a sufficient estimator.

(3) 90% confidence interval is narrower than 99% confidence interval.

(4) t distribution is having less variance with compared to Z distribution.

(5) An efficient estimator should be a biased estimator.

38. Confidence level which provides more reliable estimator is,

(1) 80% (3) 95% (5) 99%
(2) 90% (4) 98%

39. Components which remain after eliminating trend in a time series with annual data are,

(1) Seasonal variations and cyclic variations.

(2) Seasonal variations and irregular variations.

(3) Irregular variations and cyclic variations.

(4) Seasonal variations, cyclic variations and irregular variations.

(5) Irregular variations only.

40. Equation which can be obtained after converting annual trend line of Y=156+28.8X into monthly trend line is,

(1) Y=13+2.4X (4) Y=156+0.2X
(2) Y=156+2.4X (5) Y=1.08+0.2X
(3) Y=13+0.2X

41. Factor which is not influence on cyclic variations is,

(1) Economic recessions (4) Political changes.
(2) Introduction of new products. (5) Personal customs.
(3) Long term changes in personal habits.

42. Quarterly increment in annual trend line Y=160+48X is,

(1) 48 (3) 8 (5) 3
(2) 12 (4) 6

43. Quantities of current year are purchased at prices in base year under,

(1) Laspeyre's price index
(2) Paasche price index
(3) Laspeyre's quantity index
(4) Paasche quantity index
(5) Fisher's index

44. Percentage that should be increased in production quantity in order to increase income by 75% when price of a commodity increases by 50%is,

(1) 33.3%
(2) 25%
(3) 20%
(4) 16.7%
(5) 15%

45. Consumer price index in 2010 was 120. It increased up to 160 in year 2016. In order to maintain same standard of living maintained in 2010, extra income that should earn by a person who receive 24000 of salary in year 2016 is,

(1) Rs.48000
(2) Rs.40000
(3) Rs.32000
(4) Rs.16000
(5) Rs.8000

46. Index that should be used in order to present increment in exports of a country is,

(1) Price index
(2) Quantity index
(3) Value index
(4) Price and quantity index
(5) Quantity and value index

47. Which of the following statements is true?

(1) Erroneous raw materials causes for random variations.
(2) Assignable variations cannot be eliminated
(3) C chart is used to control variables.
(4) Lower control limit of a p chart can be negative.
(5) Assignable variations are not important as random variations.

48. Control chart which considers variation among samples is,

(1) x chart
(2) R chart
(3) p chart
(4) np chart
(5) C chart

49. Which of the following chart calculate control limits with the base of poisson distribution,

(1) X chart
(2) R chart
(3) p chart
(4) np chart
(5) C chart

50. Consider the following statements about OC curve

A: Decides the sample size which separate good and bad lots.
B: Reduces the risk of rejecting good lots and risk of accepting bad lots.
C: Maintains production process at standard.

Which of the above statements is/are true?

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

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Paper II

Answer five questions selecting at least two questions from each part.

Part I

1.

(a) State the merits of stem and leaf diagram and box and whisker diagram in statistical studies. (04 marks)

(b) Explain the function of pre testing and editing in statistical studies. (04 marks)

(c) What do you mean by a table?

State the characteristics of a complete table.

A study was carried out in a certain area using 500 people. According to study ratio of people who save their money in government banks, private banks and rural and other deposits is 5:4:1. Ratio of males and females who save their money in government banks is 3:2 and their ratio of savings and current accounts owners is 5:1 and 4:1 respectively. Ratio of males and females who save their money in private banks is 3:1 and their ratio of savings and current accounts owners is 3:2 and 4:1 respectively. Ratio of males and females who save their money in rural and other deposits is 1:4.

Present above data in a form of a table.

(06 marks)

(d) The data related to the monthly production of a company for two years are given below.

Month	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2014	28	36	48	72	54	52	44	38	46	54	62	88
2015	42	48	58	90	76	64	52	42	56	68	80	102

Construct Z curve and comment on it. (06 marks)

2.

(a) Explain the difference between arithmetic mean and weighted mean.

State two situations where weighted mean can be used practically. (03 marks)

(b) Consider the following distribution.

No. of accidents(x):	0	1	2	3	4	5	6 and above
No. of days(f):	20	12	8	5	3	2	0

I. Compute mean of the above distribution.

II. Compete mean of the distribution by using relative frequencies as weights and comment your result. (04 marks)

(c) Weights distribution of a class is given below.

Weight (kg):	45-49	50-54	55-59	60-64	65-69	70-74	75-79
No. of students:	6	12	15	21	18	16	12

i. Compute mode, median, mean, variance and standard deviation weight of students.

ii. Draw a histogram and construct frequency polygon on it.

iii. If 1kg=2.2pounds, compute mean, variance and standard deviation weight of students in pounds. (10 marks)

(d) Results of a survey on income of people in two cities are given below.

	City A	City B
No of people	400	500
Mean	32000	40000
Standard deviation	4800	5200

Which city is having high dispersion in income distribution? (03 marks)

3.

(a) What do you mean by an index?
State the importance of index numbers in business field. (04 marks)

(b) Consider the following index numbers.

	Laspeyre's Index	Paasche's Index	Fisher's Index
Price Index	-	-	128.4
Quantity Index	116.8	-	

If value index given as 121.6, Obtain values for index numbers which are not included in the table.
(06 marks)

(c) What do you mean by deseasonalization of a time series?
What is the practical importance of it? (03 marks)

(d) Annual trend line which computed on the base of quarterly data of a company for year 2008-2014 is given by Y=84+12.8X with the origin at 2011. Estimate trend line for finding quarterly production with the origin at first quarter in 2012. Compute expected production for quarters in 2017. Quarterly indices for previous years should be taken as 110, 80, 90 and 120 (07 marks)

4.

(a) Explain the difference between product movement coefficient of correlation and rank correlation coefficient.
(b) State one example for practical situations where can we use each measure. (04 marks)

(c) Following table provides promotional expenses and annual profit of a certain company.

Promotional expenses (Rs. thousands)	40	30	60	75	80	70	90	65
Profit (Rs. millions)	30	25	40	50	60	45	80	45

I. Obtain least squares regression line of profit on promotional expenses.
II. Compute coefficient of correlation and comment it.
III. Compute coefficient of determinant and comment it.
IV. Obtain coefficient of regression in least squares regression line of profit on advertising expenses. (04 marks)

(c) Explain the difference between random variations and assignable variations in statistical quality control.
(04 marks)

(d) In acceptance sampling plan samples of size 40 is selected and acceptance number is taken as 2.
I. Compute consumer's risk if defective proportion of product is 6.25%.
II. Compute producer's risk if defective proportion of product is 2.5%. (06 marks)

Part II

5.

(a) A and B are two independent events such that $P(A \cup B)=2/5$, $P(A)=1/4$. Compute the value of P(B).
(04 marks)

(b) Define conditional probability.
State two situation where conditional probability become important in business field. (04 marks)

(c) Probability of passing exam by A,B and C students is 70%,80% and 90% respectively.
I. Compute the probability of passing exam by all three students.
II. Compute the probability of passing the exam by at least one student.
III. Compute the probability of passing the exam by only B. (06 marks)

(d) A student expects to give a watch or a sports item for his friend's birth day. There is a probability of 70% to purchase a watch and 30% to purchase a sports item. Probability that friend would like for watch is 40%. Probability that friend would like for sports item is 80%. If friend likes the gift given by student, find the probability that it is a sports item.
(06 marks)

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6.

(a) Explain the importance of normal distribution.
State the conditions under which binomial distribution can be approximated by a normal distribution. (05 marks)

(b) 20% of items in a certain product are defective. If randomly select 10 items from this product, find the probability of getting
I. No any defective unit
II. Exactly 2 defective units.
III. Maximum two defective units
IV. At least two defective units.
(05 marks)

(c) Customer arrivals to a service station follows a Poisson distribution with 3 customer arrivals within 5 minutes. Find the probability of.
I. exactly three arrivals during 10 minutes.
II. at least 40 arrivals during one hour.
(05 marks)

(d) In an examination students obtained mean marks of 52 and standard deviation marks of 16.
I. Compute the percentage of students who obtained less than 40 marks.
II. If scholarships are granted to the 8% of students who obtain maximum marks, find the minimum marks need to obtain a scholarship.
(05 marks)

7.

(a) Explain the following terms.
I. Sampled population.
II. Sampling unit
III. Non random sampling
Iv. Non sampling errors
(04 marks)

(b) Explain stratified sampling method and mention its merits and demerits. (04 marks)

(c) Explain sampling distribution.
State the nature of sampling distribution of sample mean. (03 marks)

(d) Out of population with n=9 and p=0.5,
I. if a sample of size 36 is obtained, find the probability that sample mean exceeds 5.
II. Mention the influence on above probability if sample size is 54. (05 marks)

(e) 10% of items in a certain product are defective. Find the probability of having more than 7% of defective proportion in a random sample of 100 units.
(03 marks)

8.

(a) Explain the properties of a good point estimator. (06 marks)

(b) Explain the difference between point estimation and interval estimation.
Mention the merits of interval estimation with compared to point estimation. (04 marks)

(c) Consider the following estimators which are define in a population of mean μ and variance σ^2.

$\frac{T_1 = X_1 + 2X_2}{3}$ $T_2 = 2X_1 - X_2$ $\frac{T_3 = X_1 + 2X_2}{2}$

Which of the above estimators are unbiased?
Which is the more efficient estimator? (05 marks)

(d) Weight of chickens with age 45 days is normally distributed. Mean weight changes according to season but standard deviation remains constant at 300g.In winter season mean weight of a sample with 25 chickens received as 2.1kg.
I. Compute 90% confidence interval for mean weights of chickens in winter season.
II. If confidence level change to 95%, what would be the influence on first answer? (05 marks)