

STATISTICS FOR MANAGEMENT

Code: MB0040

Time: 2 hours

Max.Marks:140

Section-A

1Mark x 50= 50 Marks

Answer the following

1. Statistics that is used to make valid inferences from the data for effective decision making among managers or professionals is
 - a. Descriptive Statistics
 - b. Inferential Statistics
 - c. None of the above
 - d. All of the above

2. Statistics can be considered as
 - a. science
 - b. an art
 - c. both science as well as art
 - d. neither science nor art

3. A professor asked the students in a class their heights. On the basis of this information, the professor states that the average height of all the students in the university is 21 years. This is an example of
 - a. a census
 - b. descriptive statistics
 - c. an experiment
 - d. Inferential Statistics

4. The measure describing the characteristics of the population is known as
 - a. Parameter
 - b. Sample
 - c. Statistics
 - d. Census

5. Which of the following terms best describes the data collected for the first time keeping in view the objective of the survey?
 - a. Primary data
 - b. Secondary data
 - c. Important data
 - d. Personal data

6. Secondary/existing data may include which of the following?
 - a. Reports and official publications of international and national organisations
 - b. Records maintained by various government and private offices
 - c. Internet content
 - d. All of the above

7. In which of the following methods, the investigator contacts witnesses or neighbours or friends or some other third parties who are capable of supplying the necessary information.

- a. Direct personal observation
- b. Indirect oral interview
- c. Information through agencies
- d. Information through mailed questionnaires

8. What level of measurement possesses all the characteristics of interval measurement, and there exists an identifiable absolute zero point?

- a. Ratio scale
- b. Nominal scale
- c. Ordinal scale
- d. Interval scale

9. Systematic grouping of the units according to their common characteristics is

- a. Classification
- b. Tabulation
- c. Analysis
- d. Presentation

10. Which of the following graphical depictions of data represents cumulative frequencies?

- a. Histogram
- b. Frequency polygon
- c. Ogive
- d. Pie chart

11. Stubs stand for

- a. Numerical information
- b. The headings and subheadings of columns
- c. The headings and subheadings of rows
- d. The Table heading

12. A Good measure of Average should be

- a. Affected by extreme values
- b. Rigidly defined
- c. Based on some values
- d. Affected by sampling fluctuations

13. Specified average which solves problems involving variables expressed in 'time rates' that vary according to time is

- a. Arithmetic Mean
- b. Geometric Mean
- c. Harmonic Mean
- d. Mode

14. State which of the following statement holds true?

- a. Arithmetic mean cannot be determined for distributions with open-end class intervals.
- b. Harmonic mean is highly useful in the construction of index numbers.
- c. Arithmetic mean cannot be a value, which is not mentioned in the series.
- d. Geometric mean may or may not be larger than the arithmetic mean.

15. A measure which divides an array into four parts is known as

- a. Percentiles
- b. Deciles
- c. Quartiles
- d. Median

16. Algebraic sum of deviations of a set of values taken from their mean is

- a. 1
- b. 2
- c. 3
- d. 0

17. The standard deviation is:

- a. The square root of the variance
- b. A measure of variability
- c. An approximate indicator of how numbers vary from the mean
- d. All of the above

18. To compare the homogeneity or stability or consistency of two or more data sets we use

- a. Arithmetic Mean
- b. Standard Deviation
- c. Coefficient of Variation
- d. Mean Deviation

19. Which of the following represents the fiftieth percentile, or the middle point in a set of numbers arranged in order of magnitude?

- a. Mode
- b. Median
- c. Mean
- d. Variance

20. The mode for the data 8,7,6,5,6,6,7,6 is

- a. 8
- b. 7
- c. 6
- d. 5

21. The probability of an event must lie within the interval from

- a. 0 to 1
- b. -1 to 1
- c. 1 to 2
- d. -1 to 0

22. $P(A \cap B) = P(A)P(B)$ represents which rule, given that A and B are events?

- a. Addition rule
- b. Multiplication rule
- c. Conditional probability
- d. Intersection of events

23. Under which approach, the probability of an event is known before conducting the experiment?

- a. Statistical approach
- b. Subjective approach
- c. Axiomatic approach
- d. Classical approach

24. The Mathematical expectation of a random variable is given by

- a. $E(X) = \sum X_i P(X_i)$
- b. $E(X) = \sum X_i P(X_i^2)$
- c. $E(X) = \sum X_i^2 P(X_i)$
- d. $E(X) = \sum X_i^2 P(X_i^2)$

25. _____ is obtained when the binomial experiment is conducted many number of times.

- a. Probability distribution
- b. Normal distribution
- c. Poisson process
- d. Binomial process

26. If X is a Poisson variate, such that $P(X = 1) = P(X = 2)$, find $P(X = 0)$.

- a. 0.04979
- b. 0.13534
- c. 0.2382
- d. 0.14937

27. Number of heads obtained in 4 tosses of a coin is an example of

- a. Binomial distribution
- b. Bernoulli distribution
- c. Poisson distribution
- d. Normal distribution

28. Which sampling theory states that, “other things being equal, as the sample size increases, the results tend to be more reliable and accurate”?

- a. Law of statistical regularity
- b. Principle of inertia of large numbers
- c. Principle of persistence of small numbers
- d. Principle of validity

29. The use of table of random numbers is done in which sampling category?

- a. Stratified random sampling
- b. Simple random sampling
- c. Systematic sampling
- d. Cluster sampling

30. In which of the following sampling technique the choice of sample items depends exclusively on the judgment of the investigator.

- a. Snowball
- b. Convenience
- c. Judgment

d. Quota

31. A single sample statistic, used to estimate a population parameter is

- a. Point Estimate
- b. Interval Estimate
- c. Interval Estimates of the proportion
- d. All the above

32. If the sample size is less than 30 and the population standard deviation is not known, we use the _____ for estimations.

- a. Normal distributions
- b. Standard deviation
- c. Student's 't' distribution
- d. Binomial distribution

33. Rejecting a null hypothesis when it is true constitutes _____ .

- a. Type I error
- b. Type II error
- c. Producer's risk
- d. Right decision

34. The results of Chi-square test cannot be accurate if the cell frequencies in a contingency table are less than _____.

- a. 50
- b. 5
- c. 20
- d. 10

35. The _____ is also known as variance ratio test.

- a. Null hypothesis
- b. Alternate hypothesis
- c. F-test
- d. Theoretical distribution

36. Which business forecasting method is used when business indices are constructed to study and analyse the business activities on the basis of which future conditions are predetermined?

- a. Business barometers
- b. Time series analysis
- c. Extrapolation
- d. Regression analysis

37. The long- term oscillations that represent consistent rise and decline in the values of the variable are called

- a. Long term trend
- b. Seasonal variations
- c. Cyclic variations
- d. Random variables

38. Price and demand of the commodity is an example of

- a. Positive correlation
- b. Negative correlation
- c. Zero correlation
- d. multiple correlation

39. The range of the correlation coefficient is

- a. -1 to 0.
- b. 0 to 1.
- c. -1 to 1.
- d. None of the above

40. In which method we forecast the value, for the time period t , to be equal to the actual value observed in the previous period, that is, time period $(t-1)$?

- a. Mean forecast
- b. Naïve forecast
- c. Linear trend forecast
- d. Non-linear trend forecast

41. Statistical measure which is designed to express changes or differences in a variable or a group of related variables is

- a. Correlation
- b. Regression
- c. Index numbers
- d. Time series

42. Which test says, the formula should permit the interchange of price and quantity without giving inconsistent results?

- a. Unit test
- b. Time reversal test
- c. Factor reversal test
- d. Circular test

43. If we find the Geometric average of Laspeyre's and Paasches index, we get

- a. Fishers Ideal index number
- b. Dorbish and Bowleys index
- c. Laspeyre's index
- d. Paasches index

44. If the population value follows normal distribution then to have 95% confidence interval for estimate we use

- a. $Z = 1.645$
- b. $Z = 2.05$
- c. $Z = 1.96$
- d. $Z = 2.58$

45. The price of a commodity in India in 2001 was Rs. 95 per kg and in 2000 it was Rs.80 per kg. The price relative for the year 2001 is

- a. 119%
- b. 118.75%
- c. 120%

d. 119.25%

46. Index which helps in determining the effect of rise and fall in prices on different classes of consumers living in different areas is

- a. Price index
- b. Quantity index
- c. Value index
- d. Consumer price index

47. Tests satisfied by Fisher's ideal index

- a. Unit test and Time reversal test
- b. Time reversal test and Factor reversal test
- c. Factor reversal test and Circular test
- d. Unit test and Circular test

48. Which of the following is true of the null and alternative hypotheses?

- a. Exactly one hypothesis must be true
- b. both hypotheses must be true
- c. It is possible for both hypotheses to be true
- d. It is possible for neither hypothesis to be true

49. In which of the following cases, we can make statistical analysis –

- a. Purchasing medicine prescribed by a doctor
- b. Data on result of a cricket final match
- c. Marks obtained by a student in statistics
- d. Investing funds in several options

50. The Arithmetic Mean for the values 5,10,12,8,6 is

- a. 5
- b. 10
- c. 6
- d. 8.2

Section-B

2Marks x 25= 50 Marks

Answer the following

1. i. 1. The totality of all units in a survey is called _____.

ii . A _____ is a part or a subset of the population.

- a. i - Unit, ii - Statistic
- b. i - Variable, ii - Unit
- c. i - Population, ii - Sample
- d. i - Statistic, ii – Population

2. A random variable takes the values -3, -2, 1, 0, 4, 6 with probabilities $\frac{1}{12}$, $\frac{2}{12}$, $\frac{3}{12}$, $\frac{4}{12}$, $\frac{1}{12}$, $\frac{1}{12}$ respectively. The mean or expected value and variance is

- a. $\frac{1}{2}$ and $\frac{23}{4}$
- b. $\frac{2}{3}$ and $\frac{1}{2}$
- c. $\frac{23}{4}$ and $\frac{1}{2}$
- d. $\frac{5}{2}$ and $\frac{24}{5}$

3. Consider the following statements:

- i. The quantitative characteristic that varies from unit to unit is called a variable.
- ii. A variable that assumes all the values in the range is known as discrete variable.

State True or False:

- a. i- True, ii- False
- b. i - False, ii- True
- c. i- True, ii- True
- d. i- False, ii- False

4. In a bivariate data on 'x' and 'y', variance of 'x' = 49, variance of 'y' = 9 and covariance $Cov(x, y) = -17.5$. Coefficient of correlation between 'x' and 'y' is

- a. 0.833
- b. -0.833
- c. 0.933
- d. -0.933

5. i. Size of the class interval is equal to _____.

ii. Tally marks are used to construct _____.

- a. i- $\text{Range}/(1+3.322 \log N)$, ii - frequency tables
- b. i - $\text{Range}/(1+3.22 \log N)$, ii - frequency tables
- c. i - $\text{Range}/\text{number of classes}$, ii - frequency distribution
- d. i - $\text{Range}/\text{number of classes}$, ii - class interval

6. If the Standard deviation and Mean of the distribution are 2.64 and 53 respectively, the Coefficient of Variation is

- a. 4.98%
- b. 5.54%
- c. 6.64%
- d. 8.14%

7. Steps in construction of cost of living index numbers involve the following in the order of

- a. Conduct family budget inquiry, select the class of people, obtain price quotations, define the scope of the index, prepare a frame or list of persons.
- b. Define scope of the index, Select the class of people, prepare a frame or list of persons, conduct family budget inquiry, obtain price quotations.
- c. Select the class of people, define scope of the index, conduct family budge inquiry, obtain price quotations, prepare a frame or list of persons
- d. Prepare a frame or list of persons, obtain price quotations, conduct family budget inquiry, define scope of the index, select the class of people

8. 2% of the fuses manufactured by a firm are expected to be defective. The probability that a box containing 200 fuses contains defective fuses is

- a. 0.9817
- b. 0.5124
- c. 0.4523
- d. 0.2222

9. The mean and variance of the binomial distribution is

- a) np and npq
- b) n and p

- c) nq and npq
- d) npq and np

10. The Arithmetic Mean for following data is:

Age Group	0-10	10-20	20-30	30-40	40-50
No of persons	5	15	25	8	7

- a. 25.5
- b. 24.5
- c. 26.5
- d. 27.5

11. i. Questions that are answered only if the respondent gives a particular response to a previous question is _____

ii. Questions where the respondents' answers are limited to a fixed set of responses are _____

- a. i - Closed ended questions, ii - Contingency questions
- b. i - Matrix questions, ii - Open ended questions
- c. i - Contingency questions, ii - Closed ended questions
- d. i - Closed ended questions, ii - Open ended questions

12. The median value of the following set of values 22, 16, 18, 13, 15, 19, 17, 20, 23 is

- a. 19
- b. 18
- c. 15
- d. 13

13. i. The theory of Business forecasting based on the assumption that most of the business data have the lag and lead relationship, that is, changes in business are successive but not simultaneous is _____

ii. The theory of business forecasting based on the assumption that history repeats itself and hence assumes that all economic and business events behave in a rhythmic order is _____

- a. i - Specific historical analogy, ii - Action and reaction theory
- b. i - Action and reaction theory, ii - Specific historical analogy
- c. i - Economic rhythm theory, ii - Sequence or time-lag theory
- d. i - Sequence or time-lag theory, ii - Economic rhythm theory

14. If average height of 30 men is 158 cm and average height of another group of 40 men is 162 cm, the average height of the combined group is

- a. 150.29
- b. 160.29
- c. 170.29
- d. 180.29

15. i. If the statistical data are classified according to the time of its occurrence, the type of classification is _____

ii. Classification based on some attributes is _____

- a. i - Chronological Classification, ii - Qualitative Classification

- b. i - Qualitative Classification, ii - Chronological Classification
- c. i - Quantitative Classification, ii - Geographical Classification
- d. i - Geographical Classification, ii – Quantitative Classification

16. Match the following with respect to Parts of a Table:

Part A	Part B
1. Source note 2. Head note 3. Captions 4. Title	A. The headings and subheadings describing the data present in the columns. B. The scope and the nature of contents in a concise form. C. It is placed at the bottom on the left hand corner. D. It is given below the title of the table to indicate the units of measurement of the data and is enclosed in brackets.

- a. 1D, 2C, 3B, 4A
- b. 1C, 2B, 3D, 4A
- c. 1C, 2D, 3A, 4B
- d. 1A, 2B, 3C, 4D

17. From a random sample of 36 New Delhi civil service personnel, the mean age and the sample standard deviation were found to be 40years and 4.5 years respectively. 95% confidence interval for the mean age of civil personnel in New Delhi is:

- a. 40 ± 1.47
- b. 42 ± 2.47
- c. 52 ± 3.37
- d. 55 ± 5.57

18. In a competition, two judges assigned the ranks for seven candidates. The Spearman's rank correlation coefficient is

Competitor	1	2	3	4	5	6	7
Judge I	5	6	4	3	2	7	1
Judge II	6	4	5	1	2	7	3

- a. 0.25
- b. 0.55
- c. 0.35
- d. 0.75

19. Heights of students are normally distributed with mean 165 cm and standard deviation 5 cm. The probability that the height of a student is greater than 177 cm is:

- a. 0.0082
- b. 1
- c. 1.2
- d. 0.5

- 20. i. The computed values of chi-square are _____
- ii. The number of degrees of freedom in a 4X4 contingency table is _____

- a. i - always negative , ii- 16
- b. i - always positive, ii- 9
- c. i - either positive or negative, ii- 8
- d. i- always zero, ii - 15

21. Given

Commodity	Base year		Current year	
	Price	Quantity	Price	Quantity
A	3	25	5	28
B	1	50	3	60
C	2	30	1	30
D	5	15	6	12

- i) Laspeyre's price index is given by
 - a. 151.92
 - b. 161.92
 - c. 171.92
 - d. 181.92
- ii) Laspeyre's quantity index number is given by
 - a. 101.54
 - b. 120.12
 - c. 90.35
 - d. 82.45

22. The time series given below shows the figures of production (in m. tonnes) of a sugar factory. The best fit for the following data is the straight line trend represented by the equation $Y = a + bX$

Year	2004	2005	2006	2007	2008	2009	2010
Production (in m. tonnes)	80	90	92	83	94	99	92

- i) The value of a is
 - a. 50
 - b. 80
 - c. 45
 - d. 90
- ii) The value of b is
 - a. 0
 - b. 10
 - c. 1
 - d. 2

23. Match the following:

Part A 1. Mode 2. Deciles 3. Median 4. Percentile	Part B A. It divides the distribution into 100 parts of equal frequency. B. It can be determined graphically (Ogives) and is not affected by extreme values. C. It divides the arrayed set of variates into ten portions of equal frequency and they are sometimes used to characterise the data for some specific purpose.
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	D. It represents fashion and often it is used in business. Thus, it corresponds to the values of variable, which occurs most frequently.
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- a. 1D, 2C, 3B, 4A
- b. 1B, 2C, 3D, 4A
- c. 1C, 2B, 3A, 4D
- d. 1A, 2B, 3C, 4D

24. Karl Pearson's correlation coefficient for the following data is

X	20	16	12	8	4
Y	22	14	4	12	8

- a. $r = 0.50$
- b. $r = 0.60$
- c. $r = 0.70$
- d. $r = -1.1$

25. In a Binomial distribution $p = 0.5$ and $n = 4$, then

- i. $P(X = 0)$ is
 - a. 0.0625
 - b. 0.078
 - c. 0.78
 - d. 0.008
- ii. $P(X \geq 2)$ is
 - a. 0.5825
 - b. 0.6875
 - c. 0.2875
 - d. 0.010

Section-C

10Marks x 2 = 20Marks

Answer the following questions

1. Explain the various methods of sampling.
2. a. The incidence of occupational disease in an industry is such that the workers have a 20% chance of suffering from it. What is the probability that out of six workers 4 or more will contract the disease?
 b. Two research workers classified some people in income groups on the basis of sampling studies. Their results are as follow:

Investigators	Income groups			Total
	Poor	Middle	Rich	
A	160	30	10	200
B	140	120	40	300
Total	300	150	50	500

Show that the sampling technique of atleast one research worker is defective.

Read the following case study and answer the following questions:

The following data represent the number of units of production per day turned out by 5 different workmen using different types of machines.

Workmen	Machine type			
	A	B	C	D
1	44	38	47	36
2	46	40	52	43
3	34	36	44	32
4	33	38	46	33
5	38	42	49	39

3. Discuss the various steps involved in the analysis of variance in two-way classification.

10Marks

4. a. Test whether the mean productivity is the same for the four different machine types.

b. Test whether 5 men differ with respect to mean productivity.

5 X2 = 10Marks