Quantitative Techniques in Management

PART A (Descriptive Type) = 32

PART B (Case Study) = 4

PART C (Multiple Choice) = 120

PART C (Short Question) = 40

PART A

Descriptive Type Question

Question 1: Define quantitative techniques. Name the two major divisions in which you can divide these techniques. Explain the modus opendi of each and give names of a few techniques under each category

Question 2: How has quantitative analysis changed the current scenario in the management world today?

Question 3: From the following data calculate the missing the missing frequency.

No. of tablets	4-8	8-12	12-16	16-20	20-24	24-28	28-32	32-36	36-40
No. of persons cured	11	13	16	14	?	9	17	6	4

The average number of tablets to curve fever was 19.9.

Question 4a: Show for the following function f(x) = x + 1/x has its Min value greater that its Max value.

Question 4b: An enquiry into the faculty budgets of middle class families gave the following information given below.

Expenses on	Food	Clothing	Fuel	Rent	Miscellaneous
%age of Expenditure	35	15	10	20	20
Price in 1999 (Rs.)	70	45	20	80	40
Price in 2000 (Rs.)	90	50	25	70	30

Compute the price index using (a) weighted A. M. of price relatives & (b) weighted G.M. Of price relatives

Question 5a: Calculate the Mean, Median and Standard Deviation of the following data

Wages Up to (Rs.)	15	30	45	60	75	90	105	120
No. of Workers	12	30	65	107	157	202	222	230

Question 5 b: Also calculate
(a). Coefficient of correlation
(b). Interquartile Range (Q3-Q1)
(c). Skewness

Question 6 a: Two brands of tyres are tested with the following results.

Life (in thousands of Kms)	Brand A	Brand B
20-25	8	6
25-30	15	20
30-35	12	32
35-40	18	30
40-45	13	12
45-50	9	0

Which brand of tyre would you use on the fleet of trucks and why?

Question 6 b: Answer the following questions.
1. The income of a person in a particular week is Rs.50 per day. Find mean deviation of his income for the week.
2. The median and variance of a distribution are 35 & 2.56 per day. Find median and variance if each observation is multiplied by 3.
3. The mode and standard deviation of a distribution are 55 and 4.33 respectively. Find mode and standard deviation if 8 is added to each observation.
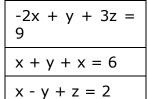4. The mean and standard deviation of a distribution are 15 & w respectively. Find mean and standard distribution if each observation is multiplied by 5.

Question 7a: Define the following Matrix with an example of each.

a. Row Mat rix	b. Column Matrix	c. Zero or Null Matrix
d. Square Matrix	e. Diagonal Matrix	f. Scalar Matrix
g. Unit or Identity Matrix	h. Upper Triangular Matrix	i. Lower Triangular Matrix

j. Comparable Matrix	k. Equal Matrix	

Question 7 b. Solve the following equations using MATRIX method.

-2x + y + 3z = 9
x + y + x = 6
x - y + z = 2

Question 8: Two women customers are randomly selected in a super market and are asked to taste 7 different types of juices and rank them in order of preference from 7(best) to 1(least desirable). The results are as follows.

Juices	A	B	C	D	E	F	G
MANU	2	1	4	3	5	7	6
SONU	1	3	2	4	5	6	7

1. Calculate the Rank Correlation and Coefficient.
2. Is the relationship significant?

Question 9a: Fit a straight line trend by the method of least square to the following data.

Year	Production
1991	240
1992	255
1993	225
1994	260
1995	280

b. Estimate the likely production for the year 2000.
c. When will the production be double that of year 1993?

Question 10a: The income of a group of 10,000 persons was found to be normally distributed with mean Rs.750PM and standard deviation =Rs.50 show that of this group 95% had income exceeding Rs.668 and only 5% had income exceeding RS.832.

Question 10 b: In a locality, out of 5000 people residing, 1200 are above 30 years of age and 3000 are females. Out of the 1200 who are above 30, 200 are females. Suppose, after a person is chosen you are told that the person is a female. What is the probability that she is above 30 years of age?

Question 11: State and illustrate Addition & Multiplication Theorem of Probability.

Question 12: There are three companies A, B, and C manufacturing 40%, 35% and 25% bolts respectively. All these companies are manufacturing 3%, 5% and 8% defective bolts respectively. If one bolt is selected find the probability that this bolt is taken from company B.

Question 13 (a): A random sample of 200 tins of oil gave an average weight of 4.95 kgs with a SD of 21kg. Do we accept the hypothesis of weight of 5 kg per tin at 1% level (The value of Z at 1% level is 2.58):

Question 13 (b): Find minimize cost for following matrix using VAM methods.

Factories	Warehouse 1	Warehouse 2	Warehouse 3	Supply
F1	16	20	12	200
F2	14	8	18	169
F3	26	24	16	90
Demand	180	120	150	

Question 14: What are sampling techniques? Briefly explain the cluster sampling technique.

Question 15: What is the significance of Regression Analysis? How does it help a manager in the decision making process?

Question 16: Explain the following terms in detail (give examples where necessary): -
        (a.) Arithmetic mean
        (b.) Harmonic mean
        (c.) Geometric mean
        (d.) Median
        (e.) Mode

Question 17: Explain the classical approach to the probability theory. Also explain the limitation of classical definition of probability.

Question 18: Write a note on decision making in management. How one will take decision under risk and uncertainty.

Question 19: The Mumbai Cricket Club, a professional club for the cricketers, has the player who led the league in batting average for many years. Over the past ten years, Amod Kambali has achieved a mean batting average of 54.50 runs with a standard deviation of 5.5 runs. This year Amod played 25 matches and achieved an average of 48.80 runs only. Amod is negotiating his contract with the club for the next year, and the salary he will be able to obtain is highly dependent upon his ability to convince the team's owner that his batting average this year was not significantly worse than in the previous years. The selection committee of the club is willing to use a 0.01 significance level.

You are required to find out whether Amod's salary will be cut next year.

Question 20: The salaries paid to the managers of a company had a mean of Rs. 20,000 with a standard deviation of Rs 3,000, What will be the mean and standard deviation if all the salaries are increased by
1) 10%
2) 10% of existing mean
3) Which policy would you recommend if the management does not want to have increased disparities of wages?

Question 21: You are supplied the following data about heights of students in a college.

	Boys	Girls
Number	72	38
Averageheight (inches)	68	61
Variance of distribution	9	4

Find out:
(a). In which sex, boys or girls, is there greater variability in individual heights.
(b). Common average heights in boys and girls.
(c). Standard deviation of height of boys and girls taken together.
(d). Combined variability.

Question 22: The sales of a company in thousands of Rs for the year 1965 through 1971 are given below:

Year	1965	1966	1967	1968	1969	1970	1971
Sales	32	47	65	92	132	190	275

Estimate the sales figure for the year 1972 using an equation of the form. $Y = ab^J$ where x= year and Y= sales.

Question 23: Find the coefficient of correlation between X and Y.

X	1	2	3	4	5	6	7	8	9
Y	12	11	13	15	14	17	16	19	18

Question 24: The following are the index of annual production of a certain commodity, assume 5 yearly cycles, and find out the trend values.

Year	1941	1942	1943	1944	1945	1946	1947	1948	1949
Index	225	210	201	215	223	245	235	225	233
Year	1950	1951							
Index	249	265							

Question 25: A die is tossed 120 times with the following results:

No. turned up	1	2	3	4	5	6	Total
Frequency	30	25	18	10	22	15	120

Test the hypothesis that the die is unbiased.

Question 26: Ballast must weigh 150 kg. It can be made from two raw materials, A (with a cost of Rs. 20 per unit) and B (with a cost of Rs. 80 per unit). At least 14 units of B and no more than 20 units of A must be used. Each unit of A weighs 5 kg and each unit of B weighs 10 kg. How many units of each type of raw material must be used for a product to minimize cost?

Question 27: A company is trying to decide whether to bid for a certain contract or not. They estimate that merely preparing the bid will cost Rs. 10,000. If their company bid then they estimate that there is a 50% chance that their bid will be put on the "short-list", otherwise their bid will be rejected. Once "short-listed" the company will have to supply further detailed information (entailing costs estimated at Rs.5,000). After this stage their bid will either be accepted or rejected. The company estimates that the labor and material costs associated with the contract are Rs. 127,000. They are considering three possible bid prices, namely £155,000, £170,000 and £190,000. They estimate that the probability of these bids being accepted (once they have been short-listed) is 0.90, 0.75 and 0.35 respectively. What should the company do and what is the expected monetary value of your suggested course of action?

PART B

Case Study – 1

For determining IQ of students, standard tests were conducted and scores recorded. The recorded scores of 25 students are given below

105	145	130	150	110
127	138	112	141	140
125	131	117	101	139
104	134	128	146	141
133	125	111	116	129

Questions to be answered:

Question 1. Arrange data into ordered array.

Question 2. Construct grouped frequency distribution with suitable class intervals.

Question 3. Compute for the data:

–Relative frequency

–Cumulative frequency (<) & Cumulative Relative Frequency (<)

–Cumulative frequency (>) & Cumulative Relative Frequency (>)

Question 4. Construct for the data

a. A histogram

b. A frequency polygon

c. Cumulative relative ogive (<)

d. Cumulative relative ogive (>)

Question 5. How many students have IQ <130 and How many students have IQ ≥ 130.

Case Study – 2

For determining IQ of students, standard test were conducted and scores recorded. The recorded scores of 25 students are given below:

… …

Question 1. Arrange data into an ordered array.

Question 2. Construct a grouped frequency distribution with suitable class intervals.

Question 3. Compute for the data:

— Relative frequency

— Cumulative frequency (<) & Cumulative Relative Frequency (<)

—Cumulative frequency (>) & Cumulative Relative Frequency (>)

Question 4. Construct for the data:

(a) A histogram

(b) A Frequency polygon

(c) Cumulative relative ogive (<)

(d) Cumulative relative ogive(>)

Question 5. How many students have IQ <130 and How many students have IQ ≥ 130.

Case Study – 3

Kushal Arora, a second year MBA student, is doing a study of companies going public for the first time. He is curious to see whether or not there is a significant relationship between the sizes of the offering (in crores of rupees) and the price per share after the issue. The data are given below:

Size (in crore of rupees)	108	39	68.40	51	10.40	4.40
Price (in rupees)	12	13	19	12	6.50	4

Question

You are required to calculate the coefficient of correlation for the above data set and comment what conclusion Kushal should draw from the sample.

Case Study – 4

The Department of Environment has theorized that pollution levels are higher in winter (I & IV Quarter) than summer (II & III Quarter) and that they are increasing over the years. The following data was collected:

Quarter	I	II	III	IV
1996	293	246	231	282
1997	301	252	227	291
1998	304	259	239	296
1999	306	265	240	300

a. Determine the seasonal indices and deseasonalize the data.

b. Calculate the regression line that is described by this data.

c. Are both the assumptions of the department of Environment correct? You may test to a significance level of 0.05.

PART C

Multiple Choice Question – Set 1

1. Quantitative Techniques facilitate classification and comparison of data

True /False

2. If the data is written down as collected it is called

(a). Ordered Data

(b). Raw Data

(c). An Array

3. Any characteristic which can assume different values can be called a variable

True /False

4. A discrete variable can take

(a). Only whole number values

(b). An infinite number of values.

5. Number of children in a family is an example of

(a). Continuous Variable

(b). Discrete Variable

6. Heights of Models in a beauty contest is an example of

(a). Continuous Variable

(b). Discrete Variable

7. Rule determining the area is written as A = X

where A is a function of Variable X.

Then A is called

(a). Independent Variable

(b). Dependent Variable

8. The Absolute Value of a real number is   True / False

9. If the revenue function is TR = 50Q - 0.5Q^2 then Marginal Function MR = 50 - Q

True / False

10. If the Total Cost Function TC = 500 + 300Q - $5Q^2$ Then Marginal Cost Function MC=500-10Q

True / False

11. Conditions for Local Maxima are

First order Function $d^2y/dx^2 > 0$

True / False

12. Conditions for local Minima are

First order Function dy/dx = 0 Second Order Function $d^2y / dx^2 < 0$

True / False

13. Derivative of product of two functions

d/dx(uv) = u d/dx (v) + v d/dx

True / False

14. Derivative of log_e

d/dx (log_e u) = 1/u log $_e$ du/dx

True / False

15. A matrix is an array of m x n numbers arranged in m-columns and n-rows

True / False

16. A square matrix is one where number of rows = (number of colums)^2

True / False

17. [4 1 2 7] is a

(a). 4 x 1 matrix

(b). 1 x 4 matrix

18.   Then A is called the TRANSPOSE OF A

True / False

19. The INVERSE of the INVERSE MATRIX is the original matrix

True / False

20. Measure of Central Tendency is a data set refers to the extent to whim tt1e observations are scattered.

True / False

21. The value of all observations in the data set is taken into account when we calculate its mean

True /False

22. If the curve of a certain distribution tails off towards the right end of the measuring scale on tt1e horizontal axis the distribution is said to be positively skewed.

True /False

23. Extreme values in a data have a strong effect upon the Mode

True /False

24. If the value of mean = 35.4 and value of media = 35 the shape of the curve skewed is "right"

True /False

25. It gives equal weightage to all previous months

(a). Exponential Smoothing

(b). Moving Average

(c). Weighted Average

26. The value most often repeated in a series of observations is called

(a). Median

(b). Mode

(c). Mean

27. The difference between the largest and the smallest observations is called

(a). Geomet ric Mean

(b). the Range

(c). the Mode

28. The middle most value in a series of observations arranged in an array is called.

(a). Mode of the series

(b). Median of the series

29. When the value of two variables move in the same direction, the correlation is said to be positive.

True /False

30. Value of correlation lies between

(a). 0 to 1

(b). -1 to 1

31. Kari Pearson's coefficient of correlation is given by

32. "Line of best fit" is determined by "Method of Least Squares"

True /False

33. A decision tree is a graphic model of a decision process

True /False

34. A time series is a set of observations taken at

(a). Specified Intervals

(b). Not necessary at equal intervals

35. Quartiles are those which divide the total data into

(a). Four Equal parts

(b). Ten Equal Parts

(c). Hundred equal Parts

36. Regular variation include only seasonal variations

True / False

37. Yearly data are independent of the effect s of seasonal variations

True / False

38. For index Numbers, base year should be a year of normalcy

True / False

39. GM = SQ ROOT OF (AM* HM)

True / False

40. Variances are additive

True / False

Multiple Choice Question – Set 2

1.Which of the following is not correct about construction of bar charts?

(a). All bars should rise from the same base line

(b). Width of the bar should be proportional to the data represented

(c). The bars should be arranged from the left to right

(d). Length of the bars should be proportional to the data represented

2.Which of the following is not true about mean absolute deviation :-

(a). Mean deviation is obtained by calculating the absolute deviations of each observation from mean

(b). Mean deviation is a more comprehensive measure compared to range

(c). It is conducive to further algebraic treatment

(d). It cannot be computed for distributions with open end classes.

3.The value index number measures the--

(a). Changes in prices of a basket of commodities from one period to another

(b). Changes in quantities consumed of a basket of commodities over a period of time

(c). Change in the total monetary value of a basket of commodities over a period of time

(d). Change in the retail prices of various commodities

4.A market researcher wants to find out the buying behavior of the typical household during the weekends. He divides the city into various localities such that each locality represents the city population in terms of age group, gender and social status. Then he randomly selects five localities and surveys each household. Which of the following sampling techniques best describes the method used by the researcher :-

(a). Cluster sampling

(b). Systematic sampling

(c). Stratified sampling

(d). Convenience sampling.

5. If every item in the data set is increased by the same quantity then the standard deviation of the data set--

(a) Remains the same

(b) Increases by the same quantity by which every data item is increased

(c) Decreases by the same quantity by which every data item is increased

(d) Increases by the square root of the same quantity by which every data item is increased

6. Which of the following is true with regard to a linear equation $Y - a - bX = 0$, where X is the independent variable and Y is the dependent variable :-

(a) The slope of the straight line is 'a'

(b) The Y-intercept of the straight line is 0

(c) The Y-intercept of the straight line is 'b'

(d) The slope and the Y-intercept remain constant for all combinations of X and Y values which satisfy the equation

7. Which of the following quantitative method is not used by managers to take decision :-

(a) Linear programming

(b) Time series

(c) Regression analysis

(d) Hypothesis testing

8. In the graphical method of solving linear programming problems the feasible region is the set of all points--

(a) Which does not satisfy any of the constraints?

(b) Which satisfy exactly one of the constraints?

(c) Which satisfy all the constraints?

(d) At which the objective function has the same value?

9. Which of the following is false in regard to histogram :-

(a) The class intervals are represented by the base of the rectangles

(b) The frequencies are represented by the heights of the rectangle

(c) If the class intervals are of equal width then the bases of the rectangles will be equal in length

(d) The tallest rectangle in a histogram represents the class interval with the lowest frequency

10. Which of the following measures in not affected by the presence of extreme values in a dataset :-

(a) Range

(b) Arithmetic mean

(c) Standard deviation

(d) Median

11. $12x + 1/3y - 1/3z = -1$

$1/3x - 1/2y -1/6z = 4$

$1/6x - 5/6y + 1/2z = 3$

The values of x in the above simultaneous equations would be--

(a) 3

(b) 6

(c) 9

(d) 12

12. The following details are available with regard to a data set: $Sx = 33$, $Sx2 = 199$,

$n = 6$. If each observation in the data set is multiplied by 2 then the standard deviation of

the resulting values will be equal to:

(a) $(35/3)1/2$

(b) 35/3

(c) 3

(d) 25

13. The following data pertains to three commodities :-

Commodity Price in 2004 (Rs. /kg) Price in 1994 (Rs. /kg)

Rice

Wheat

Pulses 11.50

13.50

26 9.50

8.50

20

The base year is 1994. The unweighted aggregates price index for the year 2004 is

approximately--

(a) 115.62

(b) 125.45

(c) 134.21

(d) 250.55

14. If the regression equation is the perfect estimator of the dependent variable then which of the following is false?

(a) The standard error of estimate is zero

(b) The coefficient of correlation is zero

(c) The coefficient of determination is 1.00

(d) All the data points fall on the regression line

15. If the regression equation is a perfect estimator of the dependent variable then which of the following is false :-

(a) The standard error of estimate is zero

(b) The coefficient of correlation is zero

(c) The coefficient of determination is 1.00

(d) All the data points fall on the regression line

16. Which of the following represents the proportion of variation in the dependent variable that is explained by the regression line :-

(a) Coefficient of determination

(b) Coefficient of correlation

(c) Coefficient of variation

(d) Standard error of estimate

17. If the coefficient of correlation between the two variables lies between -1 and 0, then the covariance between them is--

(a) Positive

(b) Negative

(c) Zero

(d) Equal in magnitude to the variances of both the variables

18. If bYX is the slope of coefficient of regression line of Y on X, and bXY is the slope coefficient of regression line of X on Y then which of the following is true :-

(a) bYX is positive implies that bXY is positive

(b) bYX is positive implies that bXY is negative

(c) bYX and bXY are reciprocals

(d) The product of bYX and bXY is zero

19. A graphical method of representing states of nature and courses of action involved in decision making is referred to as--

(a) Decision tree

(b) Histogram

(c) Scatter diagram

(d) Frequency distribution

20. If the probability of occurrence of one event is not affected by the occurrence of another event and vice versa then the two events are said to be--

(a) Collectively exhaustive

(b) Independent

(c) Dependent

(d) Mutually exclusive

21. Bayes' theorem helps the statistician to calculate---

(a) Dispersion

(b) Subjective probability

(c) Posterior probability

(d) Classical probability

22. In a binomial distribution the probability of getting zero or more numbers of successes is equal to--

(a) 0

(b) 1

(c) The probability of getting zero success

(d) The probability of getting successes in all trials

23. Which of the following measures represent the scatter of the values in a data set :-

(a) Arithmetic mean

(b) Geometric mean

(c) Standard deviation

(d) Median

24. As the sample size increases--

(a) The variation of the sample mean from the population mean becomes larger

(b) The variation of the sample mean from the population mean becomes smaller

(c) The variance of the sample becomes less than the variance of the population

(d) The standard deviation of the sample becomes more than the standard deviation of the population.

25. In the graphical method of solving linear programming problems if there is a unique optimal solution, then the optimal solution--

(a) Is always found at the center of the feasible region

(b) Is always at the origin

(c) Lies outside the feasible region

(d) Is located at one of the corner points of the feasible region

26. A multiple regression equation has--

(a) Multiple dependent variables

(b) One independent variable

(c) One dependent variable

(d) A standard error of estimate equal to zero

27. Which of the following conditions indicate the existence of multiple optimal solutions when a linear programming problem is solved by the graphical method :-

(a) One of the constraints is parallel to the horizontal axis

(b) The objective function is parallel to the vertical axis

(c) The objective function is parallel to one of the edges of the feasible region which is in the direction of optimal movement of the objective function

(d) If two or more constraints are parallel to each other

28 Three persons enter into a railway carriage and there are 8 seats available. In how many ways they can seat themselves?

(a) 24

(b) 336

(c) 40

(d) 56

29. In which of the following the simple harmonics mean is appropriate :-

(a) A set of ratios using the numerators of the ratio data as weights

(b) A set of ratios using the denominators of the ratio data as weights

(c) A set of ratios which have been calculated with the same numerators

(d) A set of ratios which have been calculated with the same denominators

30. Which of the following statements is not true about standard deviation?

(a) Combined standard deviation of two or more groups can be calculated

(b) The sum of the squares of the deviations of items of any series from a value other than the arithmetic mean would always be smaller

(c) Standard deviation is independent of any change of origin

(d) Standard deviation is dependent on the change of scale

31. Which of the following is/are true with respect to geometric mean :-

(a) Geometric mean cannot be calculated if any of the value in the set is zero.

(b) Geometric mean is appropriate for averaging the ratios of change, for average of proportions, etc.

(c) Geometric mean is considered most suitable average for index numbers.

(i) Only (I) above

(ii) Only (II) above

(iii) All (I), (II) and (III) above

(iv) Only (II) above

32. The probability of getting two heads from three tosses of a fair coin is--

(a) 1/8

(b) 1/4

(c) 3/8

(d) 1/2

33. If A and B are two mutually exclusive events and P(A) = 2/3, then the probability of events A and B happening together is--

(a) 0

(b) 1/3

(c) 2/3

(d) 1/2

34. Which of the following can be directly used as the test statistic in hypothesis tests on the basis of non standardized scale :-

(a) The sample mean, when the test involves the population mean.

(b) The difference between two sample means, when the tests involve the difference between two population means.

(c) The sample proportion when the test is about the population proportion

(i) Only (a) above

(ii) Only (b) above

(iii) Only (c) above

(iv) All (a), (b), (c) above

35. A box contains 60 ball point pens out of which 10 pens are defective. 8 pens are randomly picked up from the box. The probability distribution of the number of pens which are randomly picked, will be--

(a) A discrete uniform distribution

(b) A binomial distribution

(c) A hyper geometric distribution

(d) A Chi- square distribution

36. If we consider the process of selecting a simple random sample as an experiment then which of the following can be treated as random variable(s)?

(a) Sample mean

(b) Sample standard deviation

(c) Sample range

(d) Sample median

(i) Only (a) above

(ii) Only (b) above

(iii) All (a), (b), (c), (d) above

(iv) Only (d) above

37. The covariance of random variable with itself is always--

(a) A positive quantity

(b) A negative quantity

(c) 0

(d) Less than its expected value

38. A man has 6 friends. In how many ways he can invite one or more of them to a party?

(a) 63

(b) 64

(c) 119

(d) 120

39. Find x; if logx/log2 = log36/log4

(a) 0

(b) 2

(c) 4

(d) 6

40. The empirical relationship between range (R) and mean deviation (M.D) is--

(a) 2R=15M.D

(b) 3R=17M.D

(c) R=17M.D

(d) 3R=M.D

Multiple Choice Question – Set 3

1. If A and B are independent events with P (A) = 0.25, P (B) =0.4 and P (A UB) = 0.5, then, P (A/B) & P (B/A) are

a. 0.25 & 0.4

b. 0.600 & 0.275

c. 0.725 & 0.275

d. 0.650 & 0.650

e. 0.542 & 0.335

2. If you want to test the whether the change is significant on the mean body weight on a group of randomly chosen people after a particular diet is administered, you should employ

a. Paired-t test

b. A simple t test

c. An independent single sample t test

d. An independent two sample t test

e. Variance test

3. Cluster sampling is

a. a non-probability sampling method

b. the same as convenience sampling

c. a probability sampling method

d. Judgement sampling

e. None of these alternatives is correct.

4. A LP problem has 3 decision variables and 5 constraints. How many non basic variables are there?

a. 3

b. 5

c. 8

d. 7

e. 2

5. If a random variable X is distributed normally with mean 30 and variance 25, find out P(X>40)

a. 0.222 0

b. 0.0228

c. 0.0954

d. 0.0233

e. 0.0919

6. A sampling method in which the population is divided into groups such that each group has a small variation with in itself and a wide variation between themselves and samples are drawn from each group is known as

a. Random sampling

b. Stratified sampling

c. Cluster sampling

d. Systematic sampling

e. Judgmental sampling

7. The following linear trend expression was estimated using a time series with 17 time periods.

T_t= 129.2 + 3.8t

The trend projection for time period 18 is

a. 68.4

b. 193.8

c. 197.6

d. 6.84 e.19.38

8. If the sampling fraction n/N is less than 0.05, the standard error of the sample mean is given by

a. $\sigma / \sqrt{n}$

b. $\sigma / \sqrt{n} \times \sqrt{(N-n)/(N-1)}$

c. $\sigma / \sqrt{n} \times \sqrt{(N/n)}$

d. $\sigma / \sqrt{n} \times \sqrt{(N-1)/(N-n)}$

e. σ

9. The sample mean is the point estimator of

a. μ

b. σ

c. x

d. p

e. S

10. A regression analysis between sales (Y in $1000) and advertising (X in dollars) resulted in the following equation

Y$ = 30,000 + 4 X

The above equation implies that an

a. Increase of $4 in advertising is associated with an increase of $4,000 in sales

b. Increase of $1 in advertising is associated with an increase of $4 in sales

c. Increase of $1 in advertising is associated with an increase of $34,000 in sales

d. Increase of $1 in advertising is associated with an increase of $4,000 in sales

e. Increase of $4 in advertising is associated with an increase of $30,000 in sales

11. A random Variable has the following probability distribution: X P(X)

0 0.05

1 0.1

2 0.15

3 0.20

4 0.25

5 0.10

6 0.15

What is the value of P(l<= X<=5)?

a. 0.80

b. 0.25

c. 0.15

d. 0.10

e. 0.30

12. Two cards are drawn without replacement from a deck of 52 cards. What is the probability of drawing two queens?

a. 1/221

b. 1/121

c. 1/321

d. 1/421

e. 1/111

13. Assume a binomial probability distribution with n = 40 and p = .55. Compute the mean and standard deviation of the random variable.

a. Mean = 22 and SD = 3.146

b. Mean = 20 and SD = 3.146

c. Mean = 24 and SD = 3.146

d. Mean = 26 and SD = 3.146

e. Mean= 18 and SD = 3.146

14. From a calendar for 2005 we sample every 11th day starting from January 7th; what type of sampling is this?

a. Judgemental sampling

b. Simple random sampling without replacement

c. Systematic sampling

d. Cluster sampling

e. Simple random sampling with replacement

15. In a goodness-of-fit test where the sample size is 200, there are 5 categories, and the significance level is .05. The critical value of x^2 is

a. 9.488

b. 11.070

c. 43.773

d. 45.887

e. 25.669

16. To conduct the sign test, we assume

a. The population is normally distributed

b. The scale of measurement is interval

c. The samples are dependent

d. There are at least 20 observations in the sample

e. There are minimum 25 observations in the sample

17. A time series component which cannot be analysed by a mathematical model is:

a. Trend

b. Seasonal

c. Cyclical

d. Random

e. Cyclical and random

18. Which of the following cannot be inferred from a scatter diagram?

a. Cause effect relationships

b. Presence or absence of relationships

c. Linear or curvilinear relationship

d. Direct or inverse relationship

e. All can be studied

19. Which of the following is true of the coefficient of determination?

a. It is the square of the correlation coefficient

b. It conveys the extent to which the variations are explained by the regression equation

c. It conveys the extent to which the variations are unexplained by the regression equation

d. Both (a) and (b) above

e. Both (a) and (c) above

20. When formulating Transportation LP problems, constraints usually deal with:

a. The number of items to be transported

b. The shipping costs associated with transporting goods

c. The distance goods are to be transported

d. The number of origins and destinations

e. The capacities of origins and requirements of destinations

21. If the coefficient of correlation between two variables X and Y is equal to one, then there is

a. No relationship between variables X and Y

b. A perfect positive linear relationship between variables X and Y

c. A perfect negative linear relationship between variables X and Y

d. A cause and affect relation exists between X and Y

e. A weak association between variables X and Y

22. An inventor claims that her new petrol additive will drastically enhance the mileage of the petrol powered cars. Currently, the vehicle runs as average mileage 15 km for one litre of petrol. The appropriate null and alternative hypotheses in evaluating her claim will be (in the order of HO and Ha)

a. X=15, X> 15

b.X=15,X<15,

c.X>15,X=15

d.X=15,X=15,

e. X= 15, X = < 15

23. After deseasonalisation, a time series can be represented as

a. Y = S x C x I

b. Y = TxSxCxI

c. Y = TxCxI

d. Y = TxSxI

e. Y = TXSXC

24. If one regression coefficient is greater than unity then the other must be:

a. Greater than the first one

b. Equal to unity

c. Less than unity

d. Equal to zero

e. Less than the first one

25. Which of the following statements is false?

a. In a proper random sampling, every element of the population has a known (and often equal) chance of being selected

b. The precision of a sample mean or sample proportion depends only upon the sample size (and not the population size) in a proper random sample

c. Convenience sampling often leads to biases in estimates since the sample is often not representative of the population

d. If a sample of 1000000 families is randomly selected from all of Kota (with about 8000000 families) and the average family income is computed, then the true value of the family income for all families in Kota is known

e. None of the above

26. For two variables x and y to be independent of each other which of the following must be true

a. $s_x = s_y$

b. $s^2_x = s^2_y$

c. Cov (x, y) = 0

d. $\bar{x} = \bar{y}$

e. $E(x) = E(y)$

27. Which of the following is a true measure of regret?

a. Maximum possible profits - realized profits

b. Maximum of minimum profits - minimum of minimum profits

c. Maximum possible profits - foregone profits

d. Maximum of maximum profits - maximum of minimum profits

e. Maximum possible profits - minimum of maximum profits.

28. A sample of 15 is drawn from a population size of 100. The finite population correction factor is

a. 0.150

b. 0.184

c. 0.523

d. 0.834

e. 0.9266

29. Which of the following represents repetitive and predictable movements around the trend line within a time period of one year or less?

a. Secular trend

b. Cyclical fluctuation

c. Seasonal variation

d. Irregul ar vari ati on

e. Temporary variation.

30. Which of the following is true with respect to the method of least squares?

a. Sum of the squared values of the horizontal distances from the regression line to the y-axis and the corresponding points of the dependent variable is minimized

b. Sum of the squared values of the vertical distances from the regression line to the x-axis and the corresponding points of the independent variable is minimized

c. Sum of the squared values of the horizontal distance from each plotted point based on the observations to the regression line is minimized

d. Sum of the squared values of the vertical distance from each plotted point to the regression line is minimized

e. None of the ab ove.

31. The probability that an observation, following a normal distribution, will lie within $[i \pm$ 1.3s is

a. 9.5 %

b. 19.0%

c. 40.3%

d. 50.0%

e. 80.6%

32. Arrivals of customers at an ATMs follow the Poisson distribution. The average arrivals per hour is 6. The probability of exact 6 arrivals in an hour is

a. 1.00

b. 0.50

c. 0.25

d. 0.16

e. 0.10

33. If a random sample of size 15 is selected from a symmetrical population with a unique mode, the degrees of freedom of the observation is

a. 14

b. 15

c. 16

d. 17

e. 18

34. In regression analysis,_____ represents how much each unit change of the independent variable changes the dependent variable.

a. Slope

b. Y - intercept

c. Standard error of estimate

d. Dependent variable

e. Coefficient of correlation

35. If two variables X and Y are perfectly positively correlated and their standard deviations are 5 and 10 respectively, then the covariance is

a. 0.40

b. 0.50

c. 2.00

d. 4.00

e. 50.00

36. The sample proportion of ripe mangoes in a large consignment is 0.7. If the upper limit of a confidence interval for the proportion of ripe mangoes in the lot is 0.86, the lower limit is:

a. 0.64

b. 0.54

c. Depends on the confidence level

d. Depends on the sample size

e. Both (c) and (d) above

37. A contingency table for two attributes consists of 24 cells. The number of degrees of freedom for the chi square test statistic is:

a. Depends on the number of rows and columns

b. 24

c. 23

d. 14

e. 15

38. Which of the following statements are true?

a. When the percent of trend is below 100, the relative cyclical trend is negative and conversely

b. When the percent of trend is below 100, the relative cyclical trend is positive and conversely

c. When the percent of trend is below 100, the relative cyclical trend is negative but not conversely

d. When the percent of trend is below 100, the relative cyclical trend is positive but not conversely

e. The two measures have to be considered independently

39. Which of the following is not true of random variations?

a. They can be identified

b. It cannot be explained mathematically

c. They occur in a random manner

d. They cannot be easily predicted

e. All are true

40. The loss from stocking a unit of a product not sold is Rs.30 while the profit from selling a unit of that product is Rs.50. The minimum probability of selling an extra unit that will justify stocking it is:

a. 3/5

b. 2/5

c. 3/8

d. 2/8

e. 3/4

Short Question – Set 1

1. The data is written down as collected it is called:

2. A discrete variable can take

3. Number of children in a family is an example of:

4. Heights of models in a beauty contest is an example of:

5. It gives equal weightage to all precious months:

6. Irregular vario us is a component of

7. The value most often repeated in a series of observation is called:

8. The difference between the largest and the smallest observations is called:

9. The middle most value in a series of observations arranged in an array is called:

10. Value of correlation lies between:

11. A time series is a set of observation taken at:

12. Quartiles are those which divide the total data into:

13. Extreme values in a data have a strong effect upon the Modes:

14. If the value of mean = 35.4 and value of median = 35 the shape of the curve skewed is "rig ht"

15. When the value of two var iables mo ve in the same direction, the correlation is said to be positive:

16. Linear pro gramming deals with only minimization problems:

17. Graphical methods fails where any of the constraints is parallel is objective function:

18. Dual of dual is notprimal:

19. Quantitative methods involve decision making through data analysis:

20. Operation Research emerged during Second World War

21. One of the objective of averag ing is compar ison:

22. Standard Deviation is simplest measure of dispersion

23. Probability lies between 0 and 1:

24. Coefficient of correlation is independent of change of origin and scale:

25. In a pie diagram the whole is represented by 180 degrees:

26. Skewness is lack of symmetry in a curve;

27. Conditional probability of an event A when B has already occurred is P(A/B) = P (A 7 B)/P (B):

28. Probability of 53 Sunday in a leap year is 2/7:

29. Measure of Central Tendency is a data set refers to the extent to which the observations are scattered:

30. The value of all obser vations in the data set is taken into account when we calculate its mean:

31. If the curve of a certain distribution tails off towards the right end of the measur ing scale on the ho rizontal axis the distr ibution is said to be positively skewed:

32. "Line of the best fit" is determined by "Method of least Squares":

33. A decision tree is a graphic model of a decision process:

34. Regular variation includes only seasonal var iation:

35. Year ly data are independent of the effects of seasonal variatio n:

36. Statistical results are always misleading:

37. GM - Square Root of (AM * IIM):

38. Variances are additive:

39. Quantitative techniques facilitate classification and comparison of data:

40.Any characteristic which can assume different values can be called a Variable: