# PILOT PAPER – 2023-2027 SYLLABUS

**CL1.4 Quantitative Methods for Business**

Certificate Level

**Time allowed**: 2 Hours.

**Total Marks:** 100

**Exam Structure**

- 50 Multiple Choice Questions (MCQ)

  - Segment A          10 MCQs
  - Segment B          13 MCQs
  - Segment C          10 MCQs
  - Segment D          12 MCQs
  - Segment E          05 MCQs

- Each 02 marks and 100 marks in total.

All questions are compulsory.

1. Simplify: $16^{-1/2} \div 64^{-2/3}$

   a) 10          b) 8          c) 4          d) 2

2. Factorize: $(8 + 27/x^3)$

   a) $(2 + 3/x)(4 - 6/x + 9/x^2)$      b) $(2 - 3/x)(4 + 6/x + 9/x^2)$
   c) $(2 + 3/x)(4 + 6/x + 9/x^2)$      d) $(2 - 3/x)(4 - 6/x + 9/x^2)$

3. Find the values of x and y: $(a^x.b^y)^{1/6} = a^{1/2}.b^{-1/3}$.

   a) x= 3   y = 2                b) x= -3   y = 2
   c) x= 3   y = -2              d) x= -3   y = -2

4. Solve for x: $x^2 - 6x + 1 = 0$

   a) $x = 3 \pm \sqrt{8}$              b) $x = 3 \pm \sqrt{6}$
   c) $x = -3 \pm \sqrt{8}$           d) $x = -3 \pm \sqrt{6}$

5. Find the gradient and the intercept on the y axis of the straight line $x/3 + y/4 = 1$.

   a) Gradient -4/3 and intercept -4      b) Gradient 4/3 and intercept 4
   c) Gradient 4/3 and intercept -4      d) Gradient -4/3 and intercept 4

6. The straight line joining (3, p) to (7, -4p) is parallel to the line joining (-1, -3) to (3,7). Find p.

   a) -2          b) -4          c) -6          d) -8

7. The 12th term of an arithmetic series is 2 and the 30th term is 38. Find the sum of the first 21 terms.

   a) 220          b) 150          c) 75          d) 0

8.  Find the range of values for which both the following inequalities are satisfied.

    x + 3 ≤ 4 and x + 5 ≥ 3

    a)  Values between -2 and 1.            b)  Values greater than -2.

    c)  Values less than 1                  d)  No common range.

9.  Differentiate the function:   3x2/ (x3 + 5)

    a)  (15x4)/ (x3 + 5)2                   b)  3x (5x3 - 30)/ (x3 + 5)4

    c)  3x (10 - x3)/ (x3 + 5)2             d)  (15x2 - 20 x)/ (x3 + 5)2

10. Integrate the function: $6x^2 + \frac{5}{2}x^3 + 6x^{3/2} + 1$

    a)  6x5/6 + 5/8 x5 + 12/5x 3/2 + x + C       b)  6x5/10 + 5/8 x3 + 12/5x 5/2 + x + C

    c)  6x4/10 + 5/8 x4 + 12/5x 5/2 + x +C       d)  6x5/5 + 5/8 x4 + 12/5x 5/2 + x +C

## Segment B

11. Performance of five workers on a given day is as follows:

| Machine No. | Worker 1 | Worker 2 | Worker 3 | Worker 4 | Worker 5 |
|---|---|---|---|---|---|
| Output (units) | 95 | 100 | 105 | 90 | 110 |

    Which of the following is true:

    a)  Mean      95; Standard deviation    6.8; Coefficient of variation 5.8%

    b)  Mean    100; Standard deviation   8.2; Coefficient of variation 7.5%

    c)  Mean    100; Standard deviation   7.1; Coefficient of variation 7.1%

    d)  Mean     105; Standard deviation   9.2; Coefficient of variation 7.0%

12. Which of the following statements is false about a histogram:

    a)  Its alternatively referred to as a bar-chart.

    b)  It shows the frequency distribution of a set of figures.

    c)  It gives an indication about the mean, median and mode.

    d)  It can be approximated by a frequency curve.

13. Identify the measures of central tendency most suitable to decide on the following:

    i. Average salary per worker where the distribution of salaries is positively skewed.

    ii. Collar size for producing shirts.

    iii. Average volume of fruit juice in a sample of 200 ml bottles.

    a) Median, mean, mode.
    b) Median, mode, mean.

    c) Mean, mode, median.
    d) Mean, median, mode.

14. Given below are performance figures of four employees during a given week.

| | Mean | Standard Deviation |
|---|---|---|
| Nimal | 20 | 3 |
| Sunil | 20 | 1 |
| Kamal | 20 | 2 |
| Bimal | 20 | 4 |

The order of performance in decreasing order:

    a) Nimal, Sunil, Kamal, Bimal
    b) Bimal, Kamal, Sunil, Nimal

    c) Sunil, Kamal, Nimal, Bimal
    d) Bimal, Nimal, Kamal, Sunil.

15. Compute the mean, median and mode of the following set of figures:

| 6 | 3 | 3 | 8 | 8 | 1 | 2 | 8 | 15 |
|---|---|---|---|---|---|---|---|---|

    a) Mean   6 ; Median 6; Mode 8
    b) Mean   7; Median 8; Mode 8

    c) Mean   6; Median 7; Mode 6
    d) Mean   8; Median 8; Mode 8

16. Which of the following is not true with respect to an ogive (cumulative frequency curve):

    a) Its slope is always on the increase or is stagnant.

    b) It indicates the number of items (or %) lying below a given value.

    c) It shows the mean value of the frequency distribution.

    d) It shows the decile values of the frequency distribution.

17. Which of the following is explained by the standard deviation:

    a) Validity.
    b) Consistency.
    c) Reliability.
    d) Compatibility.

18. A student scores 75%, 62% and 80% for the Quiz, Assignment and Final paper of the Management examination. The three components carry 20%, 30% and 50% of the overall grade. What his overall score for the Management Course.

    a) 73.6%          b) 68.4%          c) 80.0%          d) 65.2%

19. The price of a motor spare part stood at Rs.3,000/-, Rs.3,300/-, Rs.3,650/- and Rs.3,900/- at the beginning of each year over a period of three years. Compute the Geometric Mean that gives the growth of the price over the period:

    a) 1.680          b) 1.450          c) 1.250          d) 1.093

20. Which of the following statements is false:

    a) There is no one best measure of central tendency and dispersion; the choice is situational.
    b) A measure of central tendency is to be accompanied by a measure of dispersion.
    c) Although of high practical significance the mode is of little statistical significance.
    d) The frequency polygon is not a derivative of the histogram.

21. Which of the following presentation techniques is most suitable in presenting the following information:

The revenue from the product portfolio during 2022

| Product portfolio | Rs. (in Mns.) | % |
|---|---|---|
| Manufacturing | 250 | 32% |
| Hospitality | 150 | 19% |
| Plantations | 200 | 26% |
| Education | 80 | 10% |
| Insurance | 100 | 13% |

    a) Bar chart                          b) Component bar chart
    c) Multiple bar chart                 d) Pie chart

22. How could the effectiveness of the following presentation be further improved:
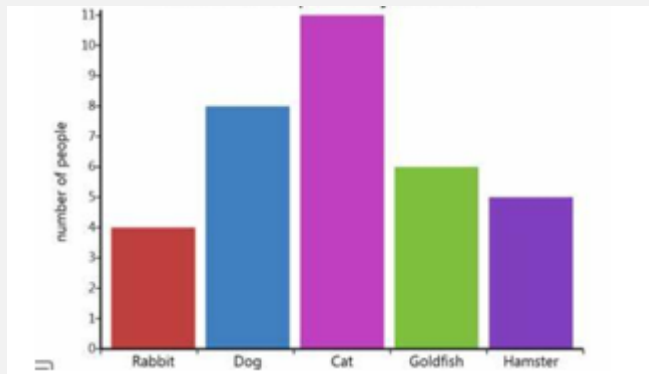


    A. Adding a percentage axis.        B. Including the title and source.

    C. Adding a brief narration of interpretation.    D. Change of colors of the bars.

a) (A) only                               b) (A) and (B) only

c) (A), (B) and (C) only.                 d) (B), (C) and (D) only.

23. Which statement is false in relation to the following chart:
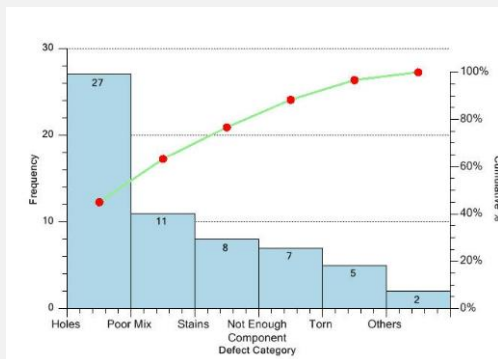


a) It distinguishes the vital few (of the items) from the trivial many.

b) It complies with Paerto's 80:20 rule.

c) It presents information both in terms of absolute values and percentages.

d) It can be used for further statistical computations.

## Segment C

24. A guest boxer has agreed to stage a fight with a local amateur boxer in the city town hall. The approach to be adopted to ascertain the probability of the local boxer winning the match:

a) Classical.        b) Relative frequency.        c) Subjective.        d) Scenario.

25. Two six-sided dice are thrown together. The probability of obtaining a sum less than 9 on the two faces.

    a) 15/18          b) 14/18          c) 13/18          d) 5/9

26. In a class of 40 pupils 18 watched 'Next door' last night and 23 watched 'West enders'. 7 watched both programmes. How many pupils did not watch either programme:

    a) 4              b) 6              c) 8              d) 10

27. Which of the following are independent events:
    A. Obtaining H and T with one throw of a coin.
    B. Obtaining H and T with two throws of a coin.
    C. Picking three successive defective items from production line.
    D. A person being dead or alive in 10 years' time.

    a) (A) and (D) only.     b) (B) and (C) only.     c) (D) only.     d) (A) and (C) only.

28. The first of two parcels contains 3 French books and 2 German books. The second parcel contains 1 French book and 3 German books. Two books are taken at random, one from each parcel. What is the probability that one book is French and the other German:

    a) 3/20.          b) 11/20.          c) 2/20.          d) 6/20.

29. Three airlines serve a small town in Bourneville. Airline A has 50% of all the scheduled flights, airline B has 30% and airline C has the remaining 20%. Their on-time rates are 80%, 65% and 40% respectively. A plane has just left on time. What is the probability that it was airline A:

    a) 0.593          b) 0.576          c) 0.543          d) 0.580

30. A market surveyor wishes to pick a sample of consumers from among small, medium and large shops. Further, he considers that gender and age should be represented in the sample. Which of the following methods is suitable for selecting the sample:

a)  Simple random sampling.
b)  Systematic random sampling.
c)  Stratified sampling.
d)  Quota sampling.

31. Which of the following statements is false in relation to sampling:

a)  Random number tables enable one to pick a stratified sample.
b)  Stratified sampling involves selecting items form each stratum.
c)  Cluster sampling involves selecting items from a few clusters.
d)  Quota sampling involves speaking to respondents who fulfil given characteristics.

32. The life time of washing machine is normally distributed with a mean of 6,000 hours and a standard deviation of 400 hours. Find the probability that one of these bulbs will last between 6,000 and 7,000 hours:

a)  0.4938
b)  0.9710
c)  0.9938
d)  0.1587

33. The life time of a washing machine is normally distributed with a mean of 6,000 hours and a standard deviation of 400 hours. Find the probability that one of these bulbs will last more than 5,000 hours:

a)  0.1587
b)  0.9710
c)  0.9938
d)  0.9910

## Segment D

34. The Hyatt Company, the television producer, is presently interested in revising its warranty policy. Analysis of a representative sample of televisions picked by the Production Department informs that it is normally distributed with a mean of 75 months and a standard deviation of 8 months. If the manufacturer wants to replace only 1% of its televisions, what should its warranty be:

a)  56 months
b)  48 months
c)  36 months
d)  24 months

35. An excerpt from the SPSS printout of a regression analysis is as given below:

Y (Sales) = 48.074 + 11.42 (Advertising Expenditure) (in Mns)

Std. error = 18.82

$R^2$ = 0.995

| Indicator | p |
|---|---|
| Constant (C) | 0.031 |
| Advertising Expenditure | 0.000 |

Level of significance: 0.05

For a unit increase of advertising expenditure increase of sales:

a) Rs. 11.42 Mn      b) Rs.48.07 Mn      c) Rs.59.49 Mn      d) Rs.36.65 Mn

36. An excerpt from the SPSS printout of a regression analysis is given below:

Y (Rs.) = 500 + 100 (No. of units produced)

Std. error = 18.82

$R^2$ = 0.800

| Indicator | p |
|---|---|
| Constant (C) | 0.011 |
| No of units produced | 0.000 |

Level of significance: 0.05

The estimated cost value for production of 10 units?

a) Rs.750      b) Rs. 1,000      c) Rs. 1,250      d) Rs. 1,500

37. An excerpt from the SPSS printout of a regression analysis is given below:

Y (Cost) = 1,250 + 40 (km travelled)

Std. error = 18.82

$R^2$ = 0.855

| Indicator | p |
|---|---|
| Constant (C) | 0.020 |
| Advertising Expenditure | 0.000 |

Level of significance: 0.05

The extent to which cost of travel; variation of sales is explained by advertising expenditure:

a) 18.82%      b) 0.1882%      c) 0.855%      d) 85.5%

38. An excerpt from the SPSS printout of a regression analysis is given below:

Y (Sales) = 480.74 + 110.42 (Units ordered)

Std. error = 28.82

$R^2$ = 0.785

| Indicator | p |
|---|---|
| Constant (C) | 0.040 |
| Advertising Expenditure (X) | 0.000 |

Level of significance: 0.05

Which of the following statements is true about C (Constant) and X (Independent variable):

a)  C is significant while X is not significant.

b)  C is not significant while X is significant.

c)  Both C and X are significant.

d)  Both C and X are not significant.

39. Which of the following statements is true:

A.  Extrapolation involves estimating the dependent variable for a value outside the given range of values.

B.  Extrapolation involves estimating the dependent variable for a value within the given range of values.

C.  Extrapolation gives more reliable values than interpolation.

D.  Extrapolation gives less reliable values than interpolation.

a)  (A) and (C)        b)  (B) and (D)        c)  (A) and (D)        d)  (B) and (C)

40. Which of the following pertaining to Pearson's correlation coefficient is false:

a)  The coefficient carries a value between -1 and +1.

b)  A high correlation value does not necessarily suggest a cause and effect relationship.

c)  A high correlation value ensures statistical significance.

d)  A value that is greater than +0.7 or less than -0.7 is deemed to be of high correlation.

41. Which of the following tools is used for predicting/ forecasting for the future:

    a) Measures of central tendency.
    b) Visual presentation techniques.
    c) Tree diagrams and normal distributions.
    d) Correlation and regression analysis.

42. The order of preference of two judges on seven popular television programme are as follows:

| TV Programme | ACL | XCN | BQR | SUW | DPL | EPQ | SWZ |
|---|---|---|---|---|---|---|---|
| Judge 1 | 3 | 2 | 4 | 5 | 1 | 7 | 6 |
| Judge 2 | 2 | 3 | 5 | 4 | 1 | 7 | 6 |

Hint: Use the Spearman's coefficient.

The agreeability among the judges:

a) Very high      b) High      c) Low      d) Very Low

43. 'The cycles that occur over short repetitive calendar periods and by definition have duration of less than one year. They refer to systematic patters that occur within a cycle of operation'.

What does the above statement signify in relation to a time series:

a) The trend                          b) Seasonal Variations
c) Cyclical variations                 d) Random variations

44. The following information relates to quarterly sales (in Rs. Mns) of an electronic item produced by Jones & Co.

Trend equation: T = 13.4 + 2.8t for quarterly sales covering the period 2017-2021. T denotes the quarterly trend values. The calculation is based on a multiplicative model of time series analysis.

| Quarter | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Seasonal index | 120 | 85 | 65 | 130 |

Estimate total sales for the year 2023.

a)  Rs. 210.20 Mn      b)  Rs. 225.60 Mn      c) Rs. 350.60 Mn      d) Rs. 400.00 Mn

45. Which of the following is false in relation to changing value of money:

   a) The future value of Rs.100 receivable in a year's time, at a rate of interest of 12% is Rs.112/-.
   b) The present value of Rs.100 receivables in a year's time, at a rate of interest of 12% is Rs.89.29.
   c) At an annual inflation rate of 20%, in order to maintain the purchasing power of money the Rs.100 today should grow to Rs.120/-.
   d) At an annual inflation rate of 20% and a going rate of interest of 12% one will enjoy a surplus on his investments.

**Segment E**

46. Consider a Rs.100,000/- FD of 10% per annum with interest paid quarterly. The effective annual interest rate (%):

   a) 10.00          b) 10.25          c) 10.38          d) 10.52

47. Consider a Rs.100,000/- fixed deposit of 10% per annum with interest paid quarterly. The cumulative value of the FD after 5 years.

   a) Rs.134,245/-          b) Rs.142,356/-          c) Rs.154,590/-          d) Rs.163,852/-

48. Consider the two investment plans where 4 annual payments of Rs.2,500/- are made (i) at the end of each year (ii) beginning of each year, at 10% rate of interest.
   How are these cash payments known in the study of finance:

   a) Annuity due and ordinary annuity respectively.
   b) Ordinary annuity and annuity due respectively.
   c) Annuity due and annuity due respectively.
   d) Ordinary annuity and ordinary annuity respectively.

49. Consider the investment plans where 4 annual payments of Rs.2,500/- are made at the beginning of each year, at 10% rate of interest. The value that will be accumulated at the end of the fourth year:

    a) Rs.10,680/-          b) Rs.11,340/-          c) Rs.11,760/-          d) Rs.12,760/-

50. Susiritha Company wishes to obtain a bank loan to fund one of its new projects. The Prosperity Bank offers to provide the requisite funds of Rs.50 Mn. at a rate of 14% to be settled in five equal installments. Compute the annual installment (principal and the interest).

    a) Rs.14.5 Mn          b) Rs.13.6 Mn          c) Rs.12.8 Mn          d) Rs.11.4 Mn

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