Skillshort

Self-Study Preparation Pack

CMA FOUNDATION

Paper 3: Fundamentals of Business Mathematics and Statistics (FBMS)

Module-wise Practice Questions with Answers

8 modules × 10 MCQs = 80 original questions that do not repeat the mocks · answers computed and checked by program · key with working after each module

80 MCQs | Working for every answer | Target: 8/10 per module

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This subject pack has 6 parts

1 Chapter-wise notes
2 Important topics & weightage
3 Past papers: trends & links
4 Mock tests + solutions
5 Chapter practice questions
6 Last-week plan & strategy

Prepared by Skillshort for self-study. Original explanations and questions; not an official ICAI/ICMAI/ICSI publication. Items marked VERIFY should be checked against the latest official material.

How to practise

Do each module set in **12 minutes** (about 70 seconds a question – the exam speed) after revising that module in file 01. Check with the key below the set. Below 7/10 → revise and repeat after two days.

Module 1: Arithmetic

1. An amount of ₹14,000 is divided among P, Q and R in the ratio 3 : 5 : 6. The share of Q is:

(a) ₹6,000 (b) ₹5,000
(c) ₹9,000 (d) ₹3,000

2. The mean proportional between 2 and 8 is:

(a) 4 (b) 6
(c) 5 (d) 8

3. x varies inversely as y, and x = 4 when y = 36. The value of x when y = 24 is:

(a) 7 (b) 8/3
(c) 8 (d) 6

4. A sum amounts to ₹89,600 in 2 years and ₹1,04,000 in 5 years at simple interest. The rate of interest is:

(a) 8% (b) 6%
(c) 5% (d) 12%

5. The difference between compound interest and simple interest on ₹10,000 for 3 years at 8% p.a. is:

(a) ₹295.68 (b) ₹197.12
(c) ₹64 (d) ₹80

6. A train 200 m long runs at 72 km/h. Time taken to pass a pole is:

(a) 8 seconds (b) 25/9 seconds
(c) 10 seconds (d) 12 seconds

7. The sum of the first 25 terms of the AP 2, 5, 8, ... is:

(a) 950 (b) 1,025
(c) 1,850 (d) 948

8. The future value of an annuity of ₹10,000 payable at the end of each year for 6 years at 10% p.a. compound interest is (nearest rupee):

(a) ₹60,000 (b) ₹43,553
(c) ₹84,872 (d) ₹77,156

9. The sum to infinity of the GP 6, 2, 2/3, ... is:

(a) 9 (b) 13
(c) 10 (d) 9/2

10. A can complete a work in 20 days and B in 30 days. Working together, they will complete it in:

(a) 14 days (b) 10 days
(c) 25 days (d) 12 days

Answers – Module 1: Arithmetic

Q	Ans	Explanation / working
1	(b)	Total parts 14; one part = ₹1,000; Q = 5 × ₹1,000 = ₹5,000.

Q	Ans	Explanation / working
2	(a)	Mean proportional = √(2 × 8) = √16 = 4.
3	(d)	xy = k = 4 × 36 = 144; x = 144/24 = 6.
4	(b)	SI for 3 years = ₹14,400 → 1 year ₹4,800; P = ₹89,600 − 2 × ₹4,800 = ₹80,000; R = 4,800 × 100/80,000 = 6%.
5	(b)	For 3 years: P(r/100)²(3 + r/100) = ₹197.12.
6	(c)	72 km/h = 72 × 5/18 = 20 m/s; time = 200/20 = 10 s.
7	(a)	S_n = n/2 [2a + (n − 1)d] = 25/2 × [4 + 72] = 950.
8	(d)	FV = 10,000 × [(1.1)^6 − 1]/0.1 = 10,000 × 7.7156 = ₹77,156.
9	(a)	S∞ = a/(1 − r) = 6/(1 − (1/3)) = 9.
10	(d)	1/20 + 1/30 = 1/12 per day → 12 days.

Module 2: Algebra

1. If A has 3 elements and B has 5 elements, the number of relations from A to B is:

(a) 32,768 (b) 15
(c) 256 (d) 125

2. The value of (32)^(4/5) is:

(a) 8 (b) 16
(c) 18 (d) 32

3. Given log 2 = 0.3010 and log 3 = 0.4771, log 144 = ?

(a) 2.5104 (b) 1.6811
(c) 2.1582 (d) 2.4592

4. The number of arrangements of the letters of the word "BANANA" is:

(a) 720 (b) 60
(c) 30 (d) 120

5. If α and β are the roots of $x^2 - 5x + 4 = 0$, then $\alpha^2 + \beta^2$ = ?

(a) 33 (b) 17
(c) 25 (d) 18

6. If α and β are the roots of $x^2 - 7x + 12 = 0$, the equation whose roots are 3α and 3β is:

(a) $x^2 - 21x + 12 = 0$ (b) $x^2 - 7x + 108 = 0$
(c) $x^2 - 21x + 108 = 0$ (d) $x^2 - 21x + 36 = 0$

7. If α and β are the roots of $x^2 - 6x + 8 = 0$, the equation whose roots are 3α and 3β is:

(a) $x^2 - 6x + 72 = 0$ (b) $x^2 - 18x + 24 = 0$
(c) $x^2 - 18x + 72 = 0$ (d) $x^2 - 18x + 8 = 0$

8. The value of 9! ÷ 7! is:

(a) 36 (b) 2
(c) 81 (d) 72

9. In how many ways can 8 persons sit around a round table if two particular persons always sit together?

(a) 10,080 (b) 1,440
(c) 720 (d) 5,040

10. In how many ways can 6 different beads be strung into a necklace?

(a) 720 (b) 120
(c) 360 (d) 60

Answers – Module 2: Algebra

Q	Ans	Explanation / working
1	(a)	Relations = subsets of A × B = 2^(3×5) = 32,768.
2	(b)	(32)^(1/5) = 2; raised to 4 → 16.
3	(c)	144 = 2^4 × 3^2 → 4(0.3010) + 2(0.4771) = 2.1582.
4	(b)	6 letters with repeats (A×3, N×2) → 6! ÷ 12 = 60.
5	(b)	$\alpha + \beta = 5$, $\alpha\beta = 4$; $\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = 25 - (8) = 17$.
6	(c)	New sum = $3(\alpha + \beta) = 21$; new product = $9\alpha\beta = 108$.
7	(c)	New sum = $3(\alpha + \beta) = 18$; new product = $9\alpha\beta = 72$.
8	(d)	9!/7! = 9 × 8 = 72.
9	(b)	Treat the pair as one: (n − 2)! × 2! = 6! × 2 = 1,440.
10	(d)	Clockwise and anticlockwise are the same: (n − 1)!/2 = 60.

Module 3: Calculus

1. The total cost function is $C(x) = 1x^2 + 4x + 100$. The minimum average cost is:

(a) ₹240 (b) ₹28
(c) ₹24 (d) ₹29

2. The total cost function is $C(x) = 1/2x^2 + 40x + 500$. The marginal cost at $x = 27$ is:

(a) ₹67 (b) ₹53.50
(c) ₹72.02 (d) ₹1,944.50

3. A product sells at ₹120 per unit; variable cost is ₹80 per unit and fixed cost is ₹10,000. The break-even quantity is:

(a) 250/3 units (b) 125 units
(c) 250 units (d) 300 units

4. If $f(x) = 2x + 6$ and $g(x) = x^2$, then $f(g(1)) = ?$

(a) 2 (b) 10
(c) 8 (d) 64

5. The total cost function is $C(x) = 2x^2 + 5x + 200$. The minimum average cost is:

(a) ₹45 (b) ₹50
(c) ₹450 (d) ₹47

6. The total cost function is $C(x) = x^2 + 28x + 500$. The marginal cost at $x = 17$ is:

(a) ₹62 (b) ₹45
(c) ₹74.41 (d) ₹1,265

7. A product sells at ₹25 per unit; variable cost is ₹15 per unit and fixed cost is ₹3,000. The break-even quantity is:

(a) 120 units (b) 350 units
(c) 300 units (d) 200 units

8. The inverse of $f(x) = 3x + 1$ is:

(a) $(x + 1)/3$ (b) $(x - 1)/3$
(c) $3x - 1$ (d) $x/3 - 1$

9. The total cost function is $C(x) = 3x^2 + 6x + 300$. The minimum average cost is:

(a) ₹71 (b) ₹66
(c) ₹660 (d) ₹72

10. If $y = 2x^3 + 8x^2 + 9$, then dy/dx at $x = 5$ is:

(a) 46 (b) 459
(c) 190 (d) 230

Answers – Module 3: Calculus

Q	Ans	Explanation / working
1	(c)	AC minimum at $x = \sqrt{(100/1)} = 10$; AC = 10 + 4 + 10 = ₹24 (= MC at that point).
2	(a)	MC = dC/dx = 1x + 40 = 67 at x = 27.
3	(c)	R = C → 120x = 10000 + 80x → x = 10000/40 = 250.
4	(c)	g(1) = 1; f(1) = 8.
5	(a)	AC minimum at $x = \sqrt{(200/2)} = 10$; AC = 20 + 5 + 20 = ₹45 (= MC at that point).
6	(a)	MC = dC/dx = 2x + 28 = 62 at x = 17.
7	(c)	R = C → 25x = 3000 + 15x → x = 3000/10 = 300.
8	(b)	y = 3x + 1 → x = (y − 1)/3.
9	(b)	AC minimum at $x = \sqrt{(300/3)} = 10$; AC = 30 + 6 + 30 = ₹66 (= MC at that point).
10	(d)	$dy/dx = 6x^2 + 16x = 230$ at x = 5.

Module 4: Statistical Representation of Data

1. The mode can be located graphically using a:

(a) Line diagram (b) Ogive
(c) Pie chart (d) Histogram

2. Which of the following is a one-dimensional diagram?

(a) Cube diagram (b) Pie chart
(c) Bar diagram (d) Square diagram

3. The class mark of the class 30–40 is:

(a) 30 (b) 10
(c) 40 (d) 35

4. The graph that helps to locate the median is the:

(a) Bar diagram (b) Ogive
(c) Histogram (d) Pie chart

5. A class such as "below 10" or "60 and above" is:

(a) An inclusive class (b) An open-end class
(c) An exclusive class (d) A class mark

6. The number of observations falling in a class is its:

(a) Class width (b) Frequency
(c) Cumulative frequency (d) Class mark

7. Which is NOT a continuous variable?

(a) Temperature
(b) Height
(c) Number of students in a class
(d) Weight

8. Data taken from a published government report are:

(a) Experimental data
(b) Secondary data
(c) Primary data
(d) Raw data collected personally

9. Data arranged according to time is called:

(a) Chronological classification (time series)
(b) Cross-sectional data
(c) Qualitative classification
(d) Spatial classification

10. Data collected for the first time by the investigator are called:

(a) Discrete data
(b) Grouped data
(c) Primary data
(d) Secondary data

Answers – Module 4: Statistical Representation of Data

Q	Ans	Explanation / working
1	(d)	Mode is located from the tallest rectangle of the histogram.
2	(c)	Only the length of the bar matters.
3	(d)	Class mark = (30 + 40)/2 = 35.
4	(b)	Less-than and more-than ogives intersect at the median.
5	(b)	One limit is missing.
6	(b)	Frequency = count in the class.
7	(c)	Counts are discrete.
8	(b)	Collected earlier by someone else.
9	(a)	Classification by time gives a time series.
10	(c)	Original data collected for the purpose of the enquiry = primary data.

Module 5: Measures of Central Tendency and Dispersion

1. The harmonic mean of 20 and 30 is:

(a) 24
(b) 25
(c) 12
(d) 24.49

2. The median of 78, 11, 33, 56, 74, 79, 17, 51 is:

(a) 33
(b) 107/2
(c) 399/8
(d) 74

3. The standard deviation of the two numbers 19 and 26 is:

(a) 49/4
(b) 7
(c) 7/2
(d) 45/2

4. If the standard deviation of x is 5, the standard deviation of y = 3 − 3x is:

(a) 15
(b) 5
(c) 18
(d) 45

5. Which is a relative measure of dispersion?

(a) Range
(b) Coefficient of variation
(c) Standard deviation
(d) Quartile deviation

6. The median of 73, 40, 69, 63, 66, 43, 25 is:

(a) 40
(b) 379/7
(c) 63
(d) 66

7. If the mean is 50 and the standard deviation is 10, the coefficient of variation is:

(a) 2%
(b) 200%
(c) 20%
(d) 500%

8. The median of 31, 22, 16, 56, 17, 43, 39, 6 is:

(a) 115/4
(b) 17
(c) 39
(d) 53/2

9. The mean deviation about the median of 2, 15, 20, 28, 29 is:

(a) 10
(b) 9
(c) 27/2
(d) 8

10. Which average is most affected by extreme values?

(a) Median
(b) None of the averages
(c) Arithmetic mean
(d) Mode

Answers – Module 5: Measures of Central Tendency and Dispersion

Q	Ans	Explanation / working
1	(a)	HM = 2ab/(a + b) = 1200/50 = 24.
2	(b)	Arranged: 11, 17, 33, 51, 56, 74, 78, 79 → median = 107/2.
3	(c)	For two numbers SD = $\|a - b\|/2$ = 7/2.
4	(a)	SD(y) = $\|b\|$ × SD(x) = 3 × 5 = 15; the constant 3 has no effect.
5	(b)	CV is unit-free ($\sigma/\bar{x} \times 100$).
6	(c)	Arranged: 25, 40, 43, 63, 66, 69, 73 → median = 63.
7	(c)	CV = $\sigma/\bar{x} \times 100$ = 10/50 × 100 = 20%.
8	(d)	Arranged: 6, 16, 17, 22, 31, 39, 43, 56 → median = 53/2.
9	(d)	Median = 20; $\Sigma\|x - 20\|$ = 40 → ÷ 5 = 8.
10	(c)	The mean uses every value, including extremes.

Module 6: Correlation and Regression

1. If b_{yx} = -4/5 and b_{xy} = -1/5, the correlation coefficient r is:

(a) 0.16
(b) 0.4
(c) -0.500
(d) -0.4

2. If one regression coefficient is greater than 1, the other must be:

(a) Less than 1
(b) Greater than 1
(c) Equal to 1
(d) Zero

3. The two regression lines are x + 3y = 56 and 3x + 4y = 98. The means $\bar{x}$ and $\bar{y}$ are:

(a) $\bar{x}$ = 16, $\bar{y}$ = 16
(b) $\bar{x}$ = 15, $\bar{y}$ = 13
(c) $\bar{x}$ = 14, $\bar{y}$ = 14
(d) $\bar{x}$ = 56, $\bar{y}$ = 49/2

4. For 6 pairs of ranks without ties, $\Sigma d^2 = 4$. The rank correlation coefficient is:

(a) 8/9
(b) -31/35
(c) 31/35
(d) 103/105

5. The two regression lines are $4x + 3y = 50$ and $x + 5y = 38$. The means $\bar{x}$ and $\bar{y}$ are:

(a) $\bar{x} = 8, \bar{y} = 6$
(b) $\bar{x} = 9, \bar{y} = 5$
(c) $\bar{x} = 25/2, \bar{y} = 38/5$
(d) $\bar{x} = 6, \bar{y} = 8$

6. For 8 pairs of ranks without ties, $\Sigma d^2 = 10$. The rank correlation coefficient is:

(a) -37/42
(b) 37/42
(c) 113/128
(d) 247/252

7. The two regression lines are $3x + 3y = 102$ and $2x + 4y = 104$. The means $\bar{x}$ and $\bar{y}$ are:

(a) $\bar{x} = 18, \bar{y} = 16$
(b) $\bar{x} = 34, \bar{y} = 26$
(c) $\bar{x} = 17, \bar{y} = 17$
(d) $\bar{x} = 16, \bar{y} = 18$

8. The two regression lines are $x + 4y = 79$ and $4x + y = 31$. The means $\bar{x}$ and $\bar{y}$ are:

(a) $\bar{x} = 19, \bar{y} = 3$
(b) $\bar{x} = 3, \bar{y} = 19$
(c) $\bar{x} = 4, \bar{y} = 18$
(d) $\bar{x} = 79, \bar{y} = 31$

9. Spearman's rank correlation is most suitable for:

(a) Time series trend
(b) Index numbers
(c) Qualitative characteristics such as beauty or honesty
(d) Large grouped frequency data

10. The two regression lines are $4x + 3y = 60$ and $2x + 3y = 48$. The means $\bar{x}$ and $\bar{y}$ are:

(a) $\bar{x} = 15, \bar{y} = 16$
(b) $\bar{x} = 6, \bar{y} = 12$
(c) $\bar{x} = 7, \bar{y} = 11$
(d) $\bar{x} = 12, \bar{y} = 6$

Answers – Module 6: Correlation and Regression

Q	Ans	Explanation / working
1	(d)	$r = \pm\sqrt{(b_{yx} \times b_{xy})} = \sqrt{0.16} = 0.4$, with the sign of the coefficients.
2	(a)	$b_{yx} \times b_{xy} = r^2 \leq 1$.
3	(c)	Both lines pass through $(\bar{x}, \bar{y})$: solving simultaneously gives $\bar{x} = 14, \bar{y} = 14$.
4	(c)	$R = 1 - 6\Sigma d^2/[n(n^2 - 1)] = 1 - 24/210 = 31/35$.
5	(a)	Both lines pass through $(\bar{x}, \bar{y})$: solving simultaneously gives $\bar{x} = 8, \bar{y} = 6$.
6	(b)	$R = 1 - 6\Sigma d^2/[n(n^2 - 1)] = 1 - 60/504 = 37/42$.
7	(d)	Both lines pass through $(\bar{x}, \bar{y})$: solving simultaneously gives $\bar{x} = 16, \bar{y} = 18$.
8	(b)	Both lines pass through $(\bar{x}, \bar{y})$: solving simultaneously gives $\bar{x} = 3, \bar{y} = 19$.
9	(c)	Ranks can be given to attributes that cannot be measured.
10	(b)	Both lines pass through $(\bar{x}, \bar{y})$: solving simultaneously gives $\bar{x} = 6, \bar{y} = 12$.

Module 7: Probability

1. A bag contains 3 red and 2 white balls. Two balls are drawn at random without replacement. The probability that both are red is:

(a) 9/25
(b) 3/10
(c) 3/5
(d) 1/10

2. A and B are independent events with P(A) = 3/5 and P(B) = 3/4. The probability that at least one of them occurs is:

(a) 9/10 (b) 1/10
(c) 9/20 (d) 19/20

3. Two fair dice are thrown. The probability that the sum is 9 is:

(a) 5/36 (b) -1/9
(c) 1/3 (d) 1/9

4. If P(A) = 3/5, P(B) = 1/5 and P(A ∩ B) = 1/10, the probability that neither A nor B occurs is:

(a) 3/10 (b) 9/10
(c) 7/10 (d) 8/25

5. The probability that a leap year selected at random contains 53 Sundays is:

(a) 1/52 (b) 2/7
(c) 53/366 (d) 1/7

6. Two events that cannot occur together are called:

(a) Independent events (b) Exhaustive events
(c) Mutually exclusive events (d) Equally likely events

7. X takes values 1, 2, 3 with probabilities 1/5, 1/2, 3/10. Var(X) = ?

(a) 21/10 (b) 49/10
(c) 49/100 (d) 14/5

8. A card is drawn from a well-shuffled pack of 52 cards. The probability that it is a red card or an ace is:

(a) 15/26 (b) 1/26
(c) 29/52 (d) 7/13

9. If P(A) = 1/2, P(B) = 1/5 and P(A ∩ B) = 1/5, the probability that neither A nor B occurs is:

(a) 3/2 (b) 4/5
(c) 2/5 (d) 1/2

10. Two fair dice are thrown. The probability that the sum is 5 is:

(a) 5/36 (b) 1/3
(c) 1/9 (d) 1/5

Answers – Module 7: Probability

Q	Ans	Explanation / working
1	(b)	3C2/5C2 = 3/10 = 3/10.
2	(a)	1 − P(A')P(B') = 1 − 2/5 × 1/4 = 9/10.
3	(d)	4 favourable outcomes out of 36 → 1/9.
4	(a)	1 − P(A ∪ B) = 1 − 7/10 = 3/10.
5	(b)	366 days = 52 weeks + 2 days → 2/7.
6	(c)	A ∩ B = ø.
7	(c)	E(X) = 21/10, E(X²) = 49/10 → Var = 49/10 − 441/100 = 49/100.
8	(d)	P = (26 + 4 − 2)/52 = 7/13.
9	(d)	1 − P(A ∪ B) = 1 − 1/2 = 1/2.
10	(c)	4 favourable outcomes out of 36 → 1/9.

Module 8: Index Numbers and Time Series

1. The long-term tendency of a time series to rise or fall is called:

(a) Cyclical variation
(b) Secular trend
(c) Random variation
(d) Seasonal variation

2. Fisher's ideal index number satisfies:

(a) Only the factor reversal test
(b) Both time reversal and factor reversal tests
(c) Only the time reversal test
(d) Neither test

3. The price of a commodity rose from ₹25 in the base year to ₹30 in the current year. The price relative is:

(a) 20
(b) 83.33
(c) 120
(d) 5

4. The 3-yearly moving average centred on 2024 is 32. The values for 2023 and 2025 are 51 and 14. The value for 2024 is:

(a) 65/2
(b) 34
(c) 31
(d) 32

5. The 3-yearly moving average centred on 2024 is 39. The values for 2023 and 2025 are 34 and 43. The value for 2024 is:

(a) 77/2
(b) 39
(c) 43
(d) 40

6. Paasche's index uses current-year quantities, so it tends to:

(a) Satisfy the factor reversal test
(b) Understate the price change
(c) Always equal Laspeyres
(d) Overstate the price change

7. The 3-yearly weighted moving average of 42, 10 and 38 with weights 1, 3, 1 is:

(a) 30.00
(b) 36.67
(c) 22.00
(d) 24.00

8. From the data below, the 3-yearly moving average for 2023 is:

Year	2020	2021	2022	2023	2024
Sales	27	55	60	60	42

(a) 58.33
(b) 55.00
(c) 54.00
(d) 48.80

9. The 3-yearly moving average centred on 2024 is 34. The values for 2023 and 2025 are 36 and 34. The value for 2024 is:

(a) 35
(b) 34
(c) 32
(d) 30

10. The 3-yearly weighted moving average of 25, 20 and 33 with weights 1, 2, 1 is:

(a) 24.50
(b) 32.67
(c) 26.00
(d) 26.50

Answers – Module 8: Index Numbers and Time Series

Q	Ans	Explanation / working
1	(b)	Trend = long-term movement.
2	(b)	Fisher = √(L × P) satisfies both tests.
3	(c)	$p_1/p_o \times 100 = 30/25 \times 100 = 120$.
4	(c)	3 × 32 − 51 − 14 = 31.
5	(d)	3 × 39 − 34 − 43 = 40.
6	(b)	Generally Laspeyres overstates and Paasche understates.
7	(c)	(1×42 + 3×10 + 1×38) ÷ 5 = 22.00.
8	(c)	(60 + 60 + 42)/3 = 54.00.
9	(c)	3 × 34 − 36 − 34 = 32.
10	(a)	(1×25 + 2×20 + 1×33) ÷ 4 = 24.50.