CMA FOUNDATION DEC-2025 EXAMINATION

PAPER-03 Fundamental of Mathematics and statistics [SET-1]

TIME: 1 HOURS   **MARKS:100**

1. The students of two classes are in the ratio of 5:7, if 10 students left from each class, the remaining students are in ratio 4:6, then the number of students in each class:

    (a) 30,40
    (b) 25, 24
    (c) 40, 60
    (d) 50,70

Working Note:

Let the students be 5x and 7x, Therefore,

$(5x - 10) / (7x - 10) = 4:6$

$6 (5x - 10) = 4(7x - 10)$

$30x – 60 = 28x - 40$

$2x = 20$

X = 10

So, the number of students are $5x = 5(10) =$ **50** & $7x = 7(10) =$ **70**

2. Find two numbers such that mean proportional between them is 18 and third proportional between them, is 144

    (a) 9, 36
    (b) 8,32
    (c) 7, 28
    (d) 6,24

Working note:

Let the numbers be x and y, therefore,

$x/18 = 18/y$

$xy = 324$

$x = 324/y$ [equation 1]

also, $x/y = y/144$

$y^2 = 144x$

$y^2 = 144 (324/y)$

$y^3 = (36)^3$

y = 36

$x = 324/36$

x = 9

3. mean proportional between 0.20 and 0.05 is:

   (a) **0.1**
   (b) 0.2
   (c) 0.3
   (d) 0.12

Working note:
Let the mean proportional be x, therefore,
$0.20/x = x/0.05$
$X^2 = (0.20)(0.05)$
$X^2 = 0.01$
X = 0.1

4. two numbers are in the ratio 5:7. If the sum of the numbers is 192, then the greater number is:

   (a) **112**
   (b) 102
   (c) 116
   (d) 108

Working note:
Let the numbers be 5x and 7x, therefore,
$5x + 7x = 192$
$12x = 192$
$X = 16$
Hence, the greater number = 7x = 7(16) = **112**

5. The effective rate equivalent to nominal rate 6% compounded monthly is:

   a. 6.05
   b. 6.16
   c. 6.26
   d. 6.07

Working note:
Effective interest rate = $(1 + r/m)^m - 1$
$= (1 + 0.06/12)^{12} - 1$
$= 0.0616$
= 6.16%

6. A person borrows ₹ 5,000 for 2 years at 4% p.a simple interest. He immediately lends to another person at 6.25% interest for 2 years. Find his gain in the transaction per year.

   (a) **₹112.50**

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(b) ₹125

(c) ₹225

(d) ₹167.50

Working note:

Gain % = 6.25 − 4 = 2.25%

Gain (₹) = 5,000 x 2.25% = **₹112.50**

7. The product of 3 terms in a G.P. is 125. The middle term is:

   (a) 3

   (b) 4

   (c) 5

   (d) 6

Working note:

Let the 3 terms be a/r, a and ar, therefore,

a/r x a x ar = 125

a^3 = 125

$a^3 = 5^3$

a = 5

i.e middle term is 5

8. A car takes 5 hours to travel 100 km. How much time would be required to cover the distance 90 km with the same speed?

   (a) 4.3 hr.

   (b) 4.5 hr.

   (c) 4.2 hr.

   (d) 4.8 hr.

Working note:

Speed = distance/time

= 100/5 = 20 km/hour

Now, time to cover 90 km at same speed is,

Time = distance/speed

= 90/20 = **4.5 hours.**

9. . in a class 60 students took mathematics and 30 took physics. If 17 students were enrolled in both the subjects, how many students all together were in the class, who took mathematics or physics or both.

(a) 90

(b) 60

(c) 73

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(d) 37

Working note:

Let the number of students who took mathematics = n(A) = 60, number of students who took physics = n(B) = 30,

Therefore, students enrolled in both subjects = **n(A∩B) = 17**

Therefore, number of students who took either or both is **n(A∪B).**

n(A∪B) = n(A) + n(B) - n(A∩B) = 60 + 30 – 17 = **73**

10. . there are 40 students, 30 of them passed in English, 25 of them passed in maths and 15 of them passed in both. Assuming that every student has passed at least in one subject. How many students passed in English only but not in maths.

(a) 15
(b) 20
(c) 10
(d) 25

Working note:

N(E) = 30

N(M) = 25

n(E∩M) = 15

now we need students passed in English only = n(E) - n(E∩M) = 30 – 15 = **15**

11. the value of logarithm of 1/10 to the base 10 is:

(a) 1
(b) -1
(c) 0
(d) 10

Working note:

$\log_{10} (1/10)$

$= \log_{10} 10^{-1}$

$= -1 \log_{10} 10$

$= -1 (1)$

= -1

12. if $\log_2 X + \log_4 X = 6$, then, the value of x is:

(a) 16
(b) 32
(c) 64
(d) 128

Working note:

$\log_2 X + \log_4 X = 6$

$(\log x/\log 2) + (\log x/\log 4) = 6$

$(\log x/\log 2) + (\log x/2\log 2) = 6$

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(log x/log2) [1 + ½] = 6
(log x/log2) 3/2 = 6
(log x/log2) = 4
Log x = 4 log 2
Log x = log 2^4
X = 2^4
X = 16

13. the number of permutations if the letters in the word "BANANA" in which two letters N do not come together is:

(a) 40
(b) 60
(c) 80
(d) 100
Working Note:
Total Possible Permutations = 6!/(2!3!) = 720/(2 x 6) = 60
Permutations where both N come together = (5! 2!)/(2!3!) = (120 x 2)/(2 x 6) = 20
Therefore, number of combinations where two letter N do not come together = 60-20 **= 40**

14. there are 20 stations on a railway line. How many different kinds of single first-class tickets must be printed, so as to enable a passenger to go from one station to another?

(a) 380
(b) 360
(c) 480
(d) 350
Working Note:
Single first-class tickets will connect any two stations one way so total tickets to be printed $20C_2$.
Also, each ticket will be printed both ways i.e. both to and from between any two stations.
Therefore, Total Tickets = 2 × $20C_2$
= 2 x (20 x 19)/(2 x 1) **= 380 tickets**

15. there are 7 questions in an examination out of which 2 are difficult. In how many ways can a student select 4 questions amongst them so that 2 difficult questions are excluded?

(a) 10
(b) 5
(c) 35
(d) 8
Working Note:
4 Questions are to be attempted out of 7, but 2 difficult questions are to be excluded, Hence, 4 questions are to be selected out of 5 questions only.
Total ways = $5C_4$
= 5!/4! 1!

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= 120/24
= 5 ways

16. if 60 is divided into two parts such that their product is 15 times their sum. The number are:

(a) (30, 30)
(b) (20, 40)
(c) (10, 50)
(d) (25, 35)
Working Note:
Let the two parts be x and 60 - x Therefore,
x(60 - x) = 15 (60)
$60x - x^2 = 900$
$X^2 - 60x + 900 = 0$
$X^2 - 30x - 30x + 900 = 0$
x(x - 30) − 30 (x - 30) = 0
(x - 30)(x - 30) = 0
x - 30 = 0
x = 30
and
x - 30 = 0
x = 30

17. the discriminant of the equation $4x^2 -5x - 3 = 0$ is:

(a) -23
(b) 23
(c) 73
(d) -73
Working note:
Discriminant = $b^2 - 4ac$
= $(-5)^2 - 4 (4) (-3)$
= 25 + 48
= 73

18. There are 10 lamps in a room. Each one of them can be switched on independently. The number of ways in which the hall can be illuminate is:

(a) 100
(b) 1024
(c) 1023
(d) 10
Working note:
Hall can be illuminated with one or more lamps. So, total ways = $2^n - 1$
= $2^{10} - 1$

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= 1024 − 1

= 1023 ways

19. if C(x) and R(x) be the cost function and the revenue function respectively, the break-even point can be found out when (x being the output)

(a) C(x) = R(x)
(b) C(x) > R(x)
(c) C(x) < R(x)
(d) R(x) = U

20. given R(x) = $20x^2 - 15x - 10$ and C(x) = $5X^2 - 3x + 16$, then the profit function is:

(a) $19X^2 - 114x - 37$
(b) $23X^2 - 24x + 30$
(c) $20X^2 - 20x + 10$
(d) $15X^2 - 12x - 26$

Working note:

Profit function = revenue function − cost function

=R(x) − C(x)

= $(20x^2 - 15x - 10) - (5x^2 - 3x + 16)$

= $20x^2 - 15x - 10 - 5x^2 + 3x - 16$

= $15x^2 - 12x - 26$

21. The basis of classification according to differences in time is called:

(a) Ordinal classification
(b) Temporal classification
(c) Spatial classification
(d) Qualitative classification

22. the cost of manufacturing an article is ₹180 and it is represented in a pie chart. If electricity cost is given by 100 degree, the sum spent on other heads is:

(a) ₹130
(b) ₹140
(c) ₹150
(d) none of these

Working note:
Total degree in a pie diagram is equal to 360 degree, which is equivalent to ₹180
Cost of electricity = 180 x 100/360 = ₹ 50
Therefore, sum of other heads = ₹180 - ₹50 = ₹130

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23. bell shaped frequency curve is used for distribution of:

(a) height
(b) marks
(c) profit
(d) all the three

24. Rank of Kth decile is:

(a) (n + 1)/2
(b) (n + 1)/4
(c) (n + 1)/10
(d) k(n + 1)/10

25. Mode is the value which:

(a) Is a mid-point
(b) Occur the most likely
(c) Average of all
(d) Most remote

26. The algebraic sum of deviations of 10 observations from the constant C is -14 and the A.M. of the observations is 7.6. The value of C is:

(a) 8
(b) 6
(c) 9
(d) 5
Working note:
Arithmetic mean = C + ∑d/n
7.6 = C + -14/10
7.6 = C − 1.4
C = 9

27. Heights (in cm) of 8 boys are: 70, 74, 70, 73, 72, 70, 74 and 70. The median is:

(a) 70 cm
(b) 71 cm
(c) 72 cm
(d) None of the above
Working note:
Arranging the values in ascending order we get,
70, 70, 70, 70, 72, 73, 74, 74
Median = (70 + 72)/2 = **71 cm**

28. the mean deviation of the numbers 95, 33, 88, 68, 32, 80, 48, 70 from the median is:

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(a) 21
(b) 24
(c) 19
(d) 16

Arranging the numbers in ascending order we get, 32, 33, 48, 68, 70, 80, 88, 95

Median = (8 + 1)/2 = 69

X	95	33	88	68	32	80	48	70	Total
|(x–A)|	26	36	19	1	37	11	21	1	152

Mean deviation about median = $\sum|(x-A)|/n$ = 152/8 = **19 [here, A = median]**

29. _____ is the positive square root of_____.

(a) variance, standard deviation
(b) standard deviation, variance
(c) any of these
(d) none of these

30. if mean = 50 cm and C.V. = 60% then the S.D. is:

(a) 25 cm
(b) 30 cm
(c) 28 cm
(d) 20 cm

Working note:

Coefficient of variation = SD x 100/mean

60 = SD x 100/50

SD = 30

31. which one of the following statement is TRUE?

(a) the scatter diagram gives precise degree of correlation.
(b) the scatter diagram is amenable to further mathematical treatment.
(c) the scatter daigram is the graphical representation of the relation between two variables.
(d) all points in a scatter diagram lie on a straight line when the correlation coefficinet is zero.

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32. compute the correlation coefficient between x and y:

X	1	2	3	4	5
y	4	6	2	1	7

(a) -0.06

(b) 0.04

(c) -0.04

(d) 0.06

Working Note:

x	y	xy	x^2	y^2
1	4	4	1	16
2	6	12	4	36
3	2	6	9	4
4	1	4	16	1
5	7	35	25	49
$\Sigma x = 15$	$\Sigma y = 20$	$\Sigma xy = 61$	$\Sigma x^2 = 55$	$\Sigma y^2 = 106$

$$r = \frac{n(\Sigma\, xy) - (\Sigma X)(\Sigma y)}{\sqrt{n \Sigma x^2 - (\Sigma X)^2\, n \Sigma y^2 - (\Sigma Y)^2}}$$

$$= \frac{5 \times 61 - 15 \times 20}{\sqrt{\{(5 \times 55) - (15 \times 15)\}\ \{(5 \times 106) - (20 \times 20)\}}}$$

$$= \frac{305 - 300}{\sqrt{50 \times 130}}$$

$$= \frac{5}{80.62}$$

$$= 0.06$$

33. calculate the coefficient of correlation between x and y from the following data:

X	7	4	6	3	5
y	13	11	10	6	10

(a) 0.81

(b) 0.19

(c) -0.81

(d) none of these

Working Note:

X	Y	X^2	Y^2	XY
7	13	49	169	91
4	11	16	121	44
6	10	36	100	60
3	6	9	36	18
5	10	25	100	50
25	50	135	526	263

$$r = \frac{n(\Sigma xy) - (\Sigma X)(\Sigma y)}{\sqrt{n \Sigma x^2 - (\Sigma X)^2\, n \Sigma y^2 - (\Sigma Y)^2}}$$

$$= \frac{5 \times 263 - 25 \times 50}{\sqrt{\{(5 \times 135) - (25 \times 25)\}\ \{(5 \times 526) - (50 \times 50)\}}}$$

$$= \frac{1315 - 1250}{\sqrt{50 \times 130}}$$

$$= 65/80.62$$

$= 0.81$

34. from the following data the Karl Pearson coefficient of correlation is:

X	6	8	10	7	10	7
y	12	10	8	12	8	10

(a) 0.97
(b) 0.85
(c) -0.93
(d) 0.65

Working Note:

X	Y	XY	X²	Y²
6	12	72	36	144
8	10	80	64	100
10	8	80	100	64
7	12	84	49	144
10	8	80	100	64
7	10	70	49	100
$\Sigma X = 48$	$\Sigma Y = 60$	$\Sigma XY = 466$	$\Sigma X^2 = 398$	$\Sigma Y^2 = 616$

$$r = \frac{n(\Sigma xy) - (\Sigma X)(\Sigma y)}{\sqrt{n \Sigma x^2 - (\Sigma X)^2 \, n \Sigma y^2 - (\Sigma Y)^2}}$$

$$= \frac{6 \times 466 - 48 \times 60}{\sqrt{\{(6 \times 398) - (48 \times 48)\} \{(6 \times 616) - (60 \times 60)\}}}$$

$$= \frac{2,796 - 2,880}{\sqrt{84 \times 96}}$$

$$= \frac{-84}{90}$$

$$= -0.93$$

35. if bxy = -0.8 and byx= -0.2, then ryx=

(a) 0.4
(b) -0.4
(c) 0.2
(d) -0.2

Working note:
r = (byx bxy)$^{1/2}$
= (-0.8 x -0.2)$^{1/}$
= -0.4 [sign of r, byx and bxy is always same]

36. the regression coefficients of x on y and y on x are -1.2 and -0.3 respectively. The correlation coefficient between x and y is:

(a) 0.6
(b) -0.6
(c) 0.06
(d) 0.06
Working note:

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$r = \sqrt{byx}\ \sqrt{bxy}$

$= \sqrt{-1.2}\ \sqrt{-0.3}$

= -0.6 [sign of r, byx and bxy is always same]

37. If an unbiased coin is tossed twice, the probability of obtaining at least one tail is:

(a) 0.25
(b) 0.50
(c) 0.75
(d) 1.00
Working note:
Outcomes with no tail = (H, H)
Probability of no tail = ¼ = 0.25
Therefore, probability of at least 1 tail = 1 – 0.25 **= 0.75**

38. A and B decides to meet at 2 to 3 PM, but agrees that they would not wait more than 10 minutes for each other. The probability that they actually meet is:

(a) 10/36
(b) 11/36
(c) 25/36
(d) 26/36
Working Note:
Time between 2 to 3 PM = 60 Minutes
Each of them will wait for 10 minutes. So, probability that they do not meet is 10 minutes of A are different than that of B.
Probability of not meeting if A arrives 1st = 50/60 = 5/6
Probability of not meeting if B arrives 1st = 50/60 = 5/6
Total Probability of not meeting = 5/6 x 5/6 = 25/36
Probability of meeting = 1 - 25/36 **= 11/36**

39. Two perfect dice are thrown simultaneously. The probability of getting a sum 8 is:

(a) 7/36
(b) 1/36
(c) 4/36
(d) 5/36
working note:
outcomes with sum of 8 = (2, 6) (6, 2) (3, 5) (5, 3) (4, 4)
probability = **5/36**

40. The probability of A hitting the target is 1/5 and the probability of B not hitting the target is 3/4 The probability of hitting the target is:

(a) 3/5
(b) 2/3

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(c) ¼
(d) 2/5
Working Note:
Probability of A not hitting the target = 1 - 1/5 = 4/5
Probability of Both not hitting the target = 4/5 x 3/4 = 3/5
Probability of hitting the target = 1 - 3/5 **= 2/5**

41. a random variable X can take the values -1, 0 and 1 with respective probabilities 0.2, 0.5 and 0.3. the expected value of X is:

(a) 0.3
(b) 0.5
(c) 0.2
(d) 0.1
Working note:
Expected value of X = -1 x 0.2 + 0 x 0.5 + 1 x 0.3 **= 0.1**

42. Given P(B) = 1/3, P(AB) = ¼, then P(A|B) is

(a) 1/2
(b) 3/4
(c) 1/4
(d) 1/3
Working note:
P(A|B) = P(AB)/P(B)
= (1/4)(1/3)
= 3/4

43. The chances of getting a defective screw from two boxes A and B are 1/5 and 1/6 respectively. A box is selected at random and a screw is drawn at random from the selected box. It is found to be defective. Find the probability that it came from box A.

(a) 5/11
(b) 2/11
(c) 6/11
(d) 4/11
Working Note:
Probability of Defective Screw from Box A = (D/A) = 1/5
Probability of Defective Screw from Box B = (D/B) = 1/6
Probability of Selecting a box P(A) or P(B) = ½

$P(A \cap D) = P(D/A) \times P(A) = 1/5 \times \frac{1}{2} = 1/10$

$P(B \cap D) = P(D/B) \times P(B) = 1/6 \times \frac{1}{2} = 1/12$

$P(D) = P(A \cap D) + P(B \cap D) = 1/10 + 1/12 = (6 + 5)/60 = 11/60$

Now, Probability of a selecting a screw from Box A, given that it is defective

$= P(A/D) = P(A \cap D)/P(D) = (1/10)/(11/60)$

$= (1/10) \times (60/11) = 6/11$

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44. Among the examinees in an examination 30%, 35% and 45% failed in Statistics, in Mathematics and in at least one of the subjects respectively. An examinee is selected at random. Find the probability that he failed in Mathematics only:

(a) **0.15**
(b) 0.2
(c) 0.254
(d) 0.55

Working note:

Event S: students failed in statistics, and event M: students failed in mathematics

$P(S) = 0.3$ and $P(S \cup M) = 0.45$

$P(S \cup M) = P(S) + P(M) - P(S \cap M)$

$0.45 = 0.30 + 0.35 - P(S \cap M)$

Then $P(S \cap M) = 0.20$

Hence P (failed in mathematics only)
$= P(M) - P(S \cap M) = 0.35 - 0.20 = \mathbf{0.15}$

45. Net monthly salary of an employee was ₹ 3,000. The consumer price index number in 1985 is 250 with 1980 as base year. If he has to be rightly compensated then the additional dearness allowance to be paid to the employee is:

(a) ₹ 4,000
(b) ₹4,800
(c) ₹5,500
(d) **₹4,500**

working note:

salary in 1985 should be = index number x base year salary (1980)/100
= 250 x 3,000/100
= ₹7,500

Additional dearness allowance = 7,500 – 3,000 **= ₹4,500**

46. Monthly salary of an employee was ₹10,000 in the year 2000 and it was increased to ₹20,000 in the year 2013 is 240 in year 2013 with the base year 2000. What should be his salary in comparison of consumer price index in the year 2013?

(a) ₹20,000
(b) ₹16,000
(c) **₹24,000**
(d) None of the above

Working note:

Salary of 2013 based on index = 10,000 x 240/100 **= ₹24,000**

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47. If the price of a commodity in a place has decreased by 30% over the base period prices, then the index number of the place is:

(a) 30
(b) 60
(c) 70
(d) 80

48. _____ play a very important role in the construction of index numbers.

(a) weights
(b) Classes
(c) Estimations
(d) None

49. The multiplicative model in a time series is expressed as:

(a) T x (-S) x (-C) x I
(b) T x S x C x I
(c) (T x S x C x I)-1
(d) $\sqrt{T \ x \ S \ x \ C \ x \ I}$

50. The simple average method is used to calculate:

(a) Trend Variation
(b) Cyclical Variation
(c) Seasonal Variation
(d) Irregular Variation

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