



CMA FOUNDATION DEC-2025 EXAMINATION

PAPER-03 Fundamental of Mathematics and statistics [SET-2]

TIME: 1 HOURS

MARKS:100

1. The fourth proportional of ₹5, ₹3.50, 150 gm is:
(a) 100 gm
(b) 105 gm
(c) 125 gm
(d) None of these

Working note:

Let the 4th proportional be x gm, therefore,

$$5/3.5 = 150/x$$

$$5x = 525$$

$$x = 105 \text{ gm}$$

2. The third proportional of 1 hour 20 minutes 1 hour 40 minutes is:
(a) 1 hours 50 minutes
(b) 2 hours
(c) 2 hours 5 minutes
(d) 2 hours 25 minutes

Working note:

$$1 \text{ hour } 20 \text{ minutes} = 80 \text{ minutes}$$

$$1 \text{ hour } 40 \text{ minutes} = 100 \text{ minutes}$$

Let third proportional be x, therefore

$$80/100 = 100/x$$

$$X = 100 \times 100/80 = 125 \text{ minutes} = 2 \text{ hours } 5 \text{ minutes}$$

3. The monthly salaries of two persons are in the ratio of 3:5. If each receives an increase of 20 in salary, the ratio is altered to 13:21. Find the respective salaries:
(a) ₹300, ₹500
(b) ₹130, ₹210
(c) ₹240, ₹400
(d) ₹400, ₹240

Working Note:

Let Salaries be 3x and 5x

Therefore, after increment,

$$(3x + 20)/(5x + 20) = 13/21$$

$$63x + 420 = 65x + 260$$

$$65x - 63x = 420 - 260$$

$$2x = 160$$



X = 80

Salaries = $3x = 3 \times 80 = ₹240$ and $5x = 5 \times 80 = ₹400$

4. What must be subtracted from each of the numbers 17, 25, 31, 47 so that the remainders may be in proportion.

- (a) 12
- (b) 6
- (c) 9
- (d) 3**

Working Note:

Let the number to be subtracted be x. Therefore,

$$(17 - x)/(25 - x) = (31 - x)/(47 - x)$$

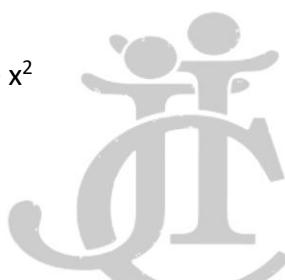
$$(17 - x)(47 - x) = (25 - x)(31 - x)$$

$$799 - 17x - 47x + x^2 = 775 - 25x - 31x + x^2$$

$$799 - 775 = 64x - 56x$$

$$24 = 8x$$

$$x = 3$$



5. A person borrowed ₹500 at the rate of 5% per annum S.I. what amount will he pay to clear the debt after 4 years?

- (a) ₹200
- (b) ₹550
- (c) ₹600**
- (d) ₹700

Working note:

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Simple interest = $PRT/100$

$$= 500 \times 5 \times 4/100$$

$$= ₹100$$

$$\text{Amount} = P + I$$

$$= 500 + 100 = ₹600$$

6. A sum of ₹10,000 is invested for simple interest at the rate of 10% per annum for 3 years.

Find the amount received as interest after 3 years.

- a. ₹3,000
- b. ₹13,000**
- c. ₹10,300
- d. ₹13,300

Working note:

Simple interest = $PRT/100$



$$\begin{aligned} &= 10,000 \times 10 \times 3/100 \\ &= ₹ 3,000 \\ \text{Amount} &= P + I \\ &= 10,000 + 3,000 \\ &= ₹13,000 \end{aligned}$$

7. The 7th term of the progression 3,-9, 27, is:

- (a) 2187
- (b) 2817
- (c) 2718
- (d) 2871

Working note:

It is evident that the series is G.P.

$$r = T_2/T_1$$

$$= -9/3$$

$$= -3$$

$$T_n = ar^{n-1}$$

$$T_7 = 3 (-3)^{7-1}$$

$$T_7 = 3 (-3)^6$$

$$T_7 = 2187$$



8. A takes 4 hours to cover a distance 80 km and B takes 5 hours to cover the same distance.

How much distance would A cover more than B in 15 hours?

- (a) 40 km
- (b) 60 km
- (c) 55 km
- (d) 45 km

Working Note:

Speed = Distance/Time

Speed of A = $80/4 = 20$ Km/Hour

Speed of B = $80/5 = 16$ Km/Hour

A's Speed is higher by $(20 - 16) = 4$ Km/Hour

Hence, A will cover $15 \times 4 = 60$ Km more than B.



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9. . A is $\{1, 2, 3, 4\}$ and B is $\{1, 4, 9, 16, 25\}$ if a function f is defined from set A to B where $f(x) = x^2$ then the range is:

- (a) $\{1, 2, 3, 4\}$
- (b) $\{1, 4, 9, 16\}$**
- (c) $\{1, 4, 9, 16, 25\}$
- (d) none of these

Working note:

$$f(x) = x^2$$

$$f(1) = 1^2 = 1$$

$$f(2) = 2^2 = 4$$

$$f(3) = 3^2 = 9$$

$$f(4) = 4^2 = 16$$

range of f is $\{1, 4, 9, 16\}$

10. . the set of all the subsets of a given set A is called _____ set of A

- (a) null set
- (b) disjoint set
- (c) power set**
- (d) none of these

11. . the digit in the unit place of $(2(4)^x)^2 + 1$ (where x is a positive integer) is:

- (a) 1
- (b) 5**
- (c) 3
- (d) none of these

Working Note:

Let $x = 1$, Therefore,

$$(2(4)^1)^2 + 1$$

$$= 8^2 + 1$$

$$= 65$$

Let $x = 2$ Therefore,

$$(2(4)^2)^2 + 1$$

$$= (2(16))^2 + 1$$

$$= 32^2 + 1$$

$$= 1,025$$

Hence, for any value of x the digit in unit place shall be 5.

12. . in the equation $2x - y = 5$, if $x = 4$ then $y = ?$

- (a) 3**
- (b) 4
- (c) -2

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(d) -5

Working note:

$$2x - y = 5$$

$$2(4) - y = 5$$

$$8 - y = 5$$

$$y = 3$$

13. the value of x when $2^x = 3^x$ is:

(a) 1

(b) 0

(c) 6

(d) none of these

Working note:

Base of 2 and 3 with power x can only be same when x = 0, that will result into both $2^0 = 1$ and $3^0 = 1$.

14. In how many ways a committee of 10 persons can be selected from 8 men and 5 women, at least 6 men are there in the committee?

(a) 230

(b) 240

(c) 270

(d) 300

Working note:

At least 6 men has to be selected, so either 6 or 7 or 8 men can be selected,

$$\text{Total ways} = 8C_6 \times 5C_4 + 8C_7 \times 5C_3 + 8C_8 \times 5C_2$$

$$= 28 \times 5 + 8 \times 10 + 1 \times 10$$

$$= 140 + 80 + 10$$

$$= 230 \text{ ways}$$

15. The value of ${}^6C_5 \times {}^6P_6$ is:

(a) 4230

(b) 4340

(c) 4320

(d) 2340

Working note:

$${}^6C_5 \times {}^6P_6$$

$$= 6 \times 720$$

$$= 4320$$

16. the number of arrangements of x books in a bookshelf is 5040, then the value of x is:



- (a) 8
- (b) 10
- (c) 7**
- (d) 5

Working note:

Number of arrangements of x books = $x!$, therefore,

$$x! = 5040$$

$$x! = 7!$$

$$x = 7$$

17. Product of the two roots of the quadratic equation $3x^2 - 5x + 2 = 0$ is:

- (a) 2/5
- (b) 3/2
- (c) 2/3**
- (d) 5/3

Working note:

Product of roots = c/a

$$= 2/3$$



18. The roots of the quadratic equation $2x^2 - 12x + 18 = 0$ are:

- (a) Reciprocal
- (b) Opposites
- (c) Equal**
- (d) None of these

Working Note:

$$2x^2 - 12x + 18 = 0$$

$$2x^2 - 6x - 6x + 18 = 0$$

$$2x(x - 3) - 6(x - 3) = 0$$

$$(2x - 6)(x - 3) = 0$$

$$2x - 6 = 0$$

$$2x = 6$$

$$x = 3$$

or

$$x - 3 = 0$$

$$x = 3$$

both the roots are equal

19. if $y = x \log x$, the dy/dx is:

- (a) 1 + log x**
- (b) $\log x$
- (c) 1
- (d) x



Working note:

$$\begin{aligned}y &= x \log x \\ \frac{dy}{dx} &= x \left(\frac{dy}{dx} \log x \right) + \log x \left(\frac{dy}{dx} x \right) \\ &= x \left(\frac{1}{x} \right) + \log x \left(1 \right) \\ &= 1 + \log x\end{aligned}$$

20. if $y = x e^x$, then $\frac{dy}{dx}$

- (a) e^x
- (b) $(x + 1) e^x$**
- (c) $x + e^x$
- (d) $1 + e^x$

Working note:

$$\begin{aligned}y &= x e^x \\ \frac{dy}{dx} &= x \left(\frac{dy}{dx} e^x \right) + e^x \left(\frac{dy}{dx} x \right) \\ &= x (e^x) + e^x (1) \\ &= e^x (x + 1)\end{aligned}$$

21. the statistical data collected during the census are _____ data to the census department.

- (a) Primary**
- (b) Secondary
- (c) Tertiary
- (d) None of these

22. out of total outlay ₹40,000 (crore) during an annual plan of a country, the central angle

represented by education of amount ₹ x crore is 72. The value of ₹ x (in crore) is:

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- (a) ₹10,000
- (b) ₹9,000
- (c) ₹6,000
- (d) ₹8,000**

Working note:

$$\begin{aligned}\text{Value of ₹ } x \text{ (in crore)} &= 40,000 \times 72/360 \\ &= ₹8,000\end{aligned}$$

23. When Class Intervals (C.I.) are unequal histogram is drawn using:

- (a) frequency
- (b) frequency density**
- (c) relative frequency
- (d) cumulative frequency

24. The weight of 6 persons are as follows (in kg.) 70, 42, 85, 75, 68, 55. Find the mean weight.



- (a) 65.83 kg.
- (b) 68.73 kg.
- (c) 70.05 kg.
- (d) 80.08 kg.

Working note:

$$\sum x = 70 + 42 + 85 + 75 + 68 + 55 = 395$$

$$\text{Mean} = 395/6 = 65.83 \text{ kg}$$

25. The heights (in cm.) of few students are as follows:

69, 75, 72, 71, 73, 74, 76, 70. Find second quartile.

- (a) 72.8 cm.
- (b) 72.6 cm.
- (c) 72.5 cm.
- (d) 72.1 cm.

Working Note:

Arranging the numbers in ascending order we get, 69, 70, 71, 72, 73, 74, 75, 76

Second Quartile = Median = $(n + 1)$ th Observation = $(8 + 1)/2 = 4.5$ th Observation

$$= (72 + 73)/2$$

$$= 72.5 \text{ cm}$$

26. A.M. of 5 observations is 6. After calculation it has been noted that observations 4 and 8 have been taken in place of observations 5 and 9 respectively. Find the correct A.M.

- (a) 5.4
- (b) 6.2
- (c) 6.4
- (d) 8.4

Working note:

$$\sum x = 5 \times 6 = 30$$

$$\text{Correct } \sum x = 30 + 5 + 9 - 4 - 8 = 32$$

$$\text{Correct mean} = 32/5 = 6.4$$

27. A motor car covered distance of 50 miles four times. The first time at 50 m.p.h, the second at 20 m.p.h, the third at 40 m.p.h, the fourth at 25 m.p.h. Calculate the average speed.

- (a) 30 m.p.h
- (b) 31 m.p.h
- (c) 40 m.p.h
- (d) 29 m.p.h

Working Note:

Speed and Time has inverse relation so, Harmonic mean will be used.

$$\text{H.M.} = 4/(1/50 + 1/20 + 1/40 + 1/25)$$

$$= 4/(0.02 + 0.05 + 0.025 + 0.04)$$

$$= 4/0.135$$

$$= 29.63 = 30 \text{ m.p.h. (Approx.)}$$



28. if the range of a set of values is 65 and maximum value in the set is 83, then the minimum value in the set is:

- (a) 74
- (b) 9
- (c) 18**
- (d) none of the above

Working Note:

Given: Maximum Value (L) = 83

Range (R) = 65

Range (R) = L - S

65 = 83 - S

S = 83 - 65

S = 18

29. A.M of 40 observations of a variable is 25 and S.D. is 4. The sum of squares of all observations is:

- (a) 25,640**
- (b) 26,540
- (c) 24,560
- (d) 26,450

Working note:

Working Note:

Mean = $\Sigma x/n$

$\Sigma x/n = 25$

Standard Deviation =

$$\sqrt{\sum x^2 / n - (\sum x / n)^2}$$

$$4 = \sqrt{\sum x^2 / 40 - (25)^2}$$

$$16 = \frac{\sum x^2}{40} - 625$$

$$641 = \sum x^2 / 40$$

$$\sum x^2 = 25,640$$

30. the mean and standard deviation of a data are 12.5 and 6.5 respectively. Then the coefficient of variation is:

- (a) 48%
- (b) 50%
- (c) 52%**
- (d) 54%

Working note:

Coefficient of skewness = SD x 100/mean

$$= 6.5 \times 100 / 12.5 = 52\%$$

31. the correlation coefficient between two variables lies between:



- (a) 0 and 1
- (b) -1 and 1**
- (c) -1 and 0
- (d) 0 and 0.5

32. When $\text{Var}(x) = 2.25$, $\text{Var}(y) = 1$ and $\text{Cov}(x, y) = 0.9$, then correlation coefficient is:

- (a) 0.45
- (b) 0.8
- (c) 0.6**
- (d) 0.75

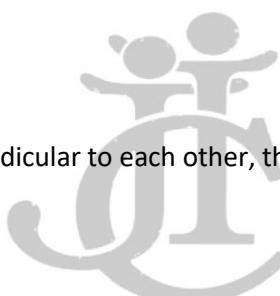
Working note:

$$\text{SD of } x = \sqrt{2.25} = 1.5$$

$$\text{SD of } Y = \sqrt{1} = 1$$

$$r = 0.9 / (1.5 \times 1)$$

$$= 0.6$$



33. if the regression lines are perpendicular to each other, then the correlation coefficient between the variables is:

- (a) 0**
- (b) -1
- (c) 1
- (d) 0.5

34. the regression equation of y on x is $3x - 5y = -12$ and regression equation of x on y is $2x - y = 7$. The value of y when $x = 10$ is:

- (a) 8.4**
- (b) 6.5
- (c) 7
- (d) 9

Working Note:

Regression equation of y on x is $3x - 5y = -12$, Therefore, Value of y , when $x = 10$ is:

$$3(10) - 5y = -12$$

$$30 - 5y = -12$$

$$5y = 30 + 12$$

$$5y = 42$$

$$y = 8.4$$

35. two random variables have the regression lines $3x + 2y = 26$ and $6x + y = 31$. The coefficient of correlation between x and y is:

- (a) -0.25
- (b) 0.5
- (c) -0.5**
- (d) 0.25



Working note:

The regression lines $3x + 2y = 26$ and $6x + y = 31$ are given. Let first equation be y on X and second be x on y respectively.

Therefore, $3x + 2y = 26$

$$y = (-3/2)x + (26/2)$$

Therefore $b_{xy} = -3/2$

and $6x + y = 31$

$$x = (-1/6)y + (31/6)$$

Therefore $b_{xy} = -1/6$

Now $r^2 = b_{yx} \cdot b_{xy}$

$$= (-3/2)(-1/6)$$

$$= -0.25$$

$$r = -0.5$$

Note: r is negative because b_{yx} and $b_{xy} < 0$

36. If the distribution are given by $x + 2y = 5$ and $2x + 3y = 8$ then the coefficient of correlation is:

- (a) 0.866
- (b) -0.666
- (c) 0.667
- (d) -0.866**

Working Note:

Let the lines of regression of Y on X and X on Y be $x + 2y = 5$ and $x + 3y = 8$ respectively,

then $b_{yx} = (-1/2)$ and $b_{xy} = (-3/2)$

$$r^2 = b_{yx} \cdot b_{xy} = (-1/2) \cdot (-3/2)$$

$$r^2 = (3/4)$$

$$r = -0.866$$

Note: r is negative because b_{yx} and $b_{xy} < 0$

37. Two coins are tossed five times, find the probability of getting an even number of heads.

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- (a) 0.5**
- (b) 1
- (c) 0.4
- (d) 0.25

Working Note:

Two coins are tossed five times, so total possible heads are 1 to 10.

Even number of Heads mean 2, 4, 6, 8, 10 heads.

Probability of even number of heads = $5C_1/10C_1 = 0.5$

38. The probability of an ordinary year having 53 Tuesdays is:

- (a) 2/7
- (b) 1/7**
- (c) 3/7
- (d) 4/7

Working Note:



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A ordinary year consists of 365 days, it contains 52 complete weeks (i.e 52 Tuesday for sure) and one more, which can be any of the seven days. Therefore, Probability of 53 Tuesdays is
 $= 1C_1/7C_1 = 1/7$

39. 4 cards are drawn from the deck of 52 cards. The probability of all the 4 cards drawn being heart is:

- (a) 11/4165
- (b) 22/4165
- (c) 25/4165
- (d) 0.60

Working Note:
Probability of all four cards being heart
 $= 13C_4/52C_4$
 $= 13 \times 12 \times 11 \times 10 / 52 \times 51 \times 50 \times 49$
 $= 11/17 \times 5 \times 49$
= 11/4165

40. If the odds against an event 3:5 the probability of that event is:

- (a) 3/8
- (b) 5/8**
- (c) 2/3
- (d) 1/3

Working note:
Odds against an event are 3:5, so odds in favour are 5:3. Therefore,
Probability of the event = **5/8**

41. For two mutually exclusive events A and B, if $P(A) = 0.4$ and $P(B) = 0.3$ then $P(A \text{ or } B)$ is:

- (a) 0.6
- (b) 0.58
- (c) 0.7**
- (d) 0.75

Working note:
A and B are mutually exclusive so, $P(A \cap B) = 0$

$$\begin{aligned} P(A \text{ or } B) &= P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ &= 0.4 + 0.3 - 0 = \mathbf{0.7} \end{aligned}$$

42. The odds are 9:5 against a person who is 50 years living till he is 70 and 8:6 against a person who is 60 living till he is 80. Find the probability that at least one of them will be alive after 20 years:

- (a) 11/14
- (b) 22/49
- (c) 31/49**
- (d) 35/49

Working Note:

Event A: Person aged 50 years will remain alive after 20 years

Event B: Person aged 60 years will remain alive after 20 years $P(A) = 5/(9 + 5) = 5/14$ and

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$$P(B) = 6/(8 + 6) = 6/14$$

$$P(A \cup B) = 5/14 + 6/14 - 5/14 \times 6/14 = 31/49$$

43. The probability of Girl getting scholarship is 0.6 and the same probability for Boy is 0.8. Find the probability that at least one of the categories getting scholarship.

- (a) 0.32
- (b) 0.44
- (c) 0.92**
- (d) None of the above

Working Note:

Probability of Girl getting scholarship $P(A) = 0.6$

Probability of Boy getting scholarship $= P(B) = 0.8$

Required to find:

Probability of at least one category getting scholarship:

$$\begin{aligned} & P(A' \cap B) + (A \cap B') + P(A \cap B) \\ &= P(A') P(B) + P(A) P(B') + P(A) P(B) \\ &= [1 - P(A)] P(B) + P(A)[1 - P(B)] + P(A) P(B) \\ &= (1 - 0.6)(0.8) + 0.6(1 - 0.8) + 0.6 \times 0.8 \\ &= 0.32 + 0.12 + 0.48 \\ &= \mathbf{0.92} \end{aligned}$$

44. Arun & Tarun appear for an interview for two vacancies. The probability of Arun's selection is $1/3$ and that of Tarun's selection is $1/5$. Find the probability that only one of them will be selected.

- (a) $2/5$**
- (b) $4/5$
- (c) $6/5$
- (d) $8/5$

Working Note:

Probability of Arun's Selection & $P(A) = 1/3$ Probability of Arun not selected $P(A') = 1 - 1/3 = 2/3$ and,

Probability of Tarun's Selection $P(T) = 1/5$. Probability of Tarun not Selected $P(T') = 1 - 1/5 = 4/5$

Probability that only one will be selected

$$\begin{aligned} &= P(A) P(T') + P(A') P(T) \\ &= 1/3 \times 4/5 + 2/3 \times 1/5 \\ &= 4/15 + 2/15 \\ &= 6/15 \\ &= \mathbf{2/5} \end{aligned}$$

45. If the prices of all commodities in a place has increased 20% in comparison to the base period prices, then the index number of prices for the place is now _____.

- (a) 100
- (b) 120**
- (c) 20
- (d) 150



46. If Fisher's index = 150 and Paasche's Index = 144, then Laspeyres index is:

- (a) 147
- (b) 156.25**
- (c) 104.17
- (d) 138

Working note:

$$\text{Fisher's index number} = (\text{Laspeyres index} \times \text{Paasche's index})^{1/2}$$

$$150 = (\text{Laspeyres index} \times 144)^{1/2}$$

$$22,500 = \text{Laspeyres index} \times 144$$

$$\text{Laspeyres index number} = 22,500/144 = \mathbf{156.25}$$

47. The suitable index number for the comparison of changes in price level of every year is _____.

- (a) Fixed Base Index Number
- (b) Fisher's Ideal Index Number
- (c) Chain Base Index Number**
- (d) Both (a) and (c)



48. P_{01} is the index for time:

- (a) 1 on 0**
- (b) 0 on 1
- (c) 1 on 1
- (d) 0 on 0

49. The following table shows number of year and corresponding value (profit) of an item in thousand rupees.

year	1	2	3	4	5	6	7	8
Values: (profit ₹'000)	2	4	5	7	8	10	13	15

Then the 3—year moving average for 6th year is:

- (a) 9.8
- (b) 11.2
- (c) 9.4
- (d) 10.3**

working note:

$$3 \text{ year---moving average for } 6^{\text{th}} \text{ year} = (8 + 10 + 13) = \mathbf{10.3}$$

50. consider the following:

year	2001	2002	2003	2004	2005	2006
Annual sales (₹'0000)	3.6	4.3	4.3	3.4	4.4	5.4

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5- year moving average for the year 2004 is:

- (a) 3.80
- (b) 4.36**
- (c) 4.00
- (d) 4.18

Working note:

5---year moving average of 2004 = $(4.3 + 4.3 + 3.4 + 4.4 + 5.4)/5 = 4.36$



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