Course: CA Foundation
Paper: Business Mathematics and Logical Reasoning and Statistics **Marks: 100**
Test: Prelim **Time Allowed: 2 Hour**
Model Answer Sheet

All Questions are Compulsory.
Section A: Business Mathematics and Logical Reasoning

1) Two numbers are in the ratio 2 : 3 and the difference of their squares is 320. The numbers are:
(a) 12, 18 (b) 16, 24
(c) 14, 21 (d) None.

2) If log 2 = 0.3010 and log 3 = 0.4771, then the value of log 24 is:
(a) 1.0791 (b) 1.7323
(c) 1.3801 (d) 1.8301

3) There are total 23 coins of ₹ 1, ₹ 2 and ₹ 5 in a bag. If their value is ₹ 43 and the ratio of coins of ₹ 1 and ₹ 2 is 3:2. Then the number of coins of ₹ 1 is:
(a) 12 (b) 5
(c) 10 (d) 14

4) $\log_{0.01} 10{,}000 = ?$
(a) 2
(b) –2
(c) 4
(d) –4

5) The price of scooter and moped are in the ratio 7 : 9. The price of moped is ₹ 1,600 more than that of scooter. Then the price of moped is:
(a) ₹ 7,200
(b) ₹ 5,600
(c) ₹ 800
(d) ₹ 700

6) A man sells 6 radios and 4 televisions for ₹ 18,480. If 14 radios and 2 televisions are sold for the same amount, what is the price of a television?
(a) ₹ 1,848 (b) ₹ 840
(c) ₹ 1,680 (d) ₹ 3,360

7) If one root of a equation is $2 + \sqrt{5}$, then the quadratic equation is :

(a) $x^2 + 4x - 1 = 0$ (b) $x^2 - 4x - 1 = 0$

(c) $x^2 + 4x + 1 = 0$ (d) $x^2 - 4x + 1 = 0$

8) A man starts his job with a certain monthly salary and earns a fixed increment every year. If his salary was ₹ 1,500 after 4 years of service and ₹ 1,800 after 10 years of service, what was his starting salary and what is the annual increment in rupees?

(a) ₹ 1,300, ₹ 50 (b) ₹ 1,100, ₹ 50

(c) ₹ 1,500, ₹ 30 (d) None.

9) A man rowing at the rate of 5 km in an hour in still water takes thrice as much time in going 40 km up the river as in going 40 km down. Find the rate at which the river flows :

(a) 9 km/hr (b) 2.5 km/hr

(c) 12 km/hr (d) None.

10) If $(2 + \sqrt{3})$ is a root of a quadratic equation $x^2 + p_x + q = 0$ then find the value of p and q.

(a) (4,– 1) (b) (4,1)

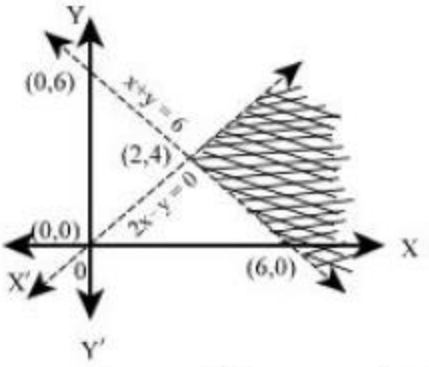
(c) (– 4,1) (d) (2,3)

11) If $|x - 2| + |x - 3| = 7$ then, 'x' will be equal to

(a) 6 (b) – 1

(c) 6 and – 1 (d) None of the above.

12) The shaded region represents :



(a) $x + y > 6, 2x - y > 0$ (b) $x + y < 6, 2x - y > 0$

(c) $x + y > 6, 2x - y < 0$ (d) None of these

13) The union forbids employer to employ less than two experienced person (x) to each fresh person (y). This situation can be expressed as:

(a) $x \leq y/2$ (b) $y \leq x/2$

(c) $y \geq x/2$ (d) None of these.

14) An employer recruits experienced (x) and fresh workmen (y) for his under the condition that he cannot employ more than 11 people. x and y can related by the inequality.

(a) $x + y \neq 11$

(b) $x + y \leq 11, x \geq 0, y \geq 0$

(c) $x + y \geq 11, x \geq 0, y \geq 0$

(d) None of these

15) Mr. X Invests ₹ 10,000 every year starting from today for next 10 years suppose interest rate is 8% per annum compounded annually. Calculate future value of the annuity:

[Given that $(1 + 0.08)^{10} = 2.15892500$]

(a) ₹ 1,56,454.88

(b) ₹ 1,44,865.625

(c) ₹ 1,56,554.88

(d) None of these

16) A certain sum of money amounts to ₹ 6,300 in two years and ₹ 7,875 in three years nine months at simple interest. Find the rate of interest per annum :

(a) 20%

(b) 18%

(c) 15%

(d) 10%

17) A company is considering proposal of purchasing a machine either by making full payment of ₹ 4,000 or by leasing it for four years at an annual rate of ₹ 1,250. Which course of action is preferable, if the company can borrow money at 14% compounded annually?

[Given : $(1.14)^4 = 1.68896$]

(a) Leasing is preferable

(b) Should be purchased

(c) No difference

(d) None of these

18) A person borrows ₹ 5,000 for 2 years at 4% p.a. simple interest . He immediately lends to another person $6\frac{1}{4}$% p.a. simple interest for 2 years. Find his gain in the transaction per year :

(a) ₹ 112.50

(b) ₹ 125

(c) ₹ 225

(d) ₹ 167.50

19) The effective rate of interest for one year deposit corresponding to a nominal 7% rate of interest per annum convertible quarterly is

(a) 7%

(b) 7.5%

(c) 7.4%

(d) 7.18%

20) A sum was invested for 3 years as per C.I. and the rate of interest for first year is 9%, 2nd year is 6% and 3rd year is 3% p.a. respectively. Find the sum if the amount in three years is ₹ 550?

(a) ₹ 250

(b) ₹ 300

(c) ₹ 462.16

(d) ₹ 350

21) Present value of a scooter is ₹ 7,290 if its value decreases every year by 10% then its value before 3 years is equal to:
(a) 10,000
(b) 10,500
(c) 20,000
(d) 20,500

22) An examination paper consists of 12 questions divided into two parts A and B. Part A contains 7 questions and part B contains 5 questions. A candidate is required to attempt 8 questions selecting at least 3 from each part. In how many maximum ways can the candidate select the questions?
(a) 35 (b) 175
(c) 210 (d) 420

23) Find the number of combinations of the letters of the word COLLEGE taken four together :
(a) 18 (b) 16
(c) 20 (d) 26

24) The letters of the word "VIOLENT" are arranged so that the vowels occupy even place only. The number of permutations is _____.
(a) 144 (b) 120
(c) 24 (d) 72

25) A person has ten friends of whom six are relatives. If he invites five guests such that three of them are his relatives, then the total number of ways in which he can invite them are:
(a) 30 (b) 60
(c) 120 (d) 75

26) A bag contains 4 red, 3 black and 2 white balls. In how many ways 3 balls can be drawn from this bag so that they include at least one black ball?
(a) 64 (b) 46
(c) 85 (d) None of the above

27) If arithmetic mean between roots of a quadratic equation is 8 and the geometric mean between them is 5, the equation is _____.
(a) $x^2 - 16x - 25 = 0$ (b) $x^2 - 16x + 25 = 0$
(c) $x^2 - 16x + 5 = 0$ (d) None of these.

28) The sum of all numbers between 100 and 1000 which are divisible by 11 will be:
(a) 44550 (b) 66770
(c) 55440 (d) 33440

29) Insert two arithmetic means between 68 and 260.
(a) 132, 196
(b) 130, 194
(c) 70, 258
(d) None of the above

30) If the AM and GM of two numbers is 6.5 and 6 the no.'s are:
(a) 3 and 2
(b) 9 and 4
(c) 81 and 16
(d) None

31) If the sum of fine terms of AP is 75. Find the third term of the series
(a) 35
(b) 30
(c) 15
(d) 20

32) In a town of 20,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B and 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers, then the number of families which buy A only is:
(a) 6600
(b) 6300
(c) 5600
(d) 600

33) If $f(x-1) = x^2 - 4x + 8$, then $f(x+1) =$ _____
(a) x^2+8
(b) x^2+7
(c) x^2+4
(d) $x^2 - 4x$

34) The number of elements in range of constant function is
(a) One
(b) Zero
(c) Infinite
(d) Indetermined

35) The inverse function f^{-1} of $f(x) = 100x$ is:
(a) $\frac{x}{100}$
(b) $\frac{1}{100x}$
(c) $\frac{1}{x}$
(d) None of these

36) $f(n) = f(n-1) + f(n-2)$ when $n = 2, 3, 4$ ..... $f(0) = 0$, $f(1) = 1$ then $f(7) = ?$
(a) 3
(b) 5
(c) 8
(d) 13

37) The derivative of $x^2 \log x$ is :
(a) $1 + 2 \log x$
(b) $2 \log x$
(c) $x(1 + 2 \log x)$
(d) None of these

38) If $x = y \log (xy)$, then $\frac{dy}{dx}$ is equal to:

(a) $\frac{x + y}{x (1 + \log xy)}$ (b) $\frac{x - y}{x (1 + \log xy)}$

(c) $\frac{x + y}{x (\log x + \log y)}$ (d) $\frac{x - y}{x (\log x + \log y)}$

39) If $x^3 - 2x^2y^2 + 5x + y = 5$, then $\frac{dy}{dx}$ at $x = 1$ and $y = 1$ is :

(a) 4/3 (b) – 5/4

(c) 4/5 (d) – 4/3

40) The slope of the tangent to the curve $y = \sqrt{4 - x^2}$ at the point, where the ordinate and the abscissa are equal, is :

(a) – 1 (b) 1

(c) 0 (d) None

41) If PLAY is coded as 8123 and RHYME is coded as 49367. What will be code of MALE?

(a) 6217 (b) 6198

(c) 6395 (d) 6285

42) Which of the following is odd one 4,12,44,176, 890 .....

(a) 4

(b) 12

(c) 44

(d) 176

43) In a certain code MADRAS is NBESBT now DELHI is coded as:

(a) EMMJI

(b) JIFEM

(c) EFMIJ

(d) CDKGH

44) Ravi left home and cycled 10 km towards South, then he turned right and cycled 5 km and then again turned right and cycled 10 km. After this he turned left and cycled 10 km. How many km. will he have to cycle to reach his home straight?

(a) 10 km (b) 15 km

(c) 12 km (d) 17 km

45) Reena walked from A to B in the East 10 Feet. The she turned to the right and walked 3 Feet. Again she turned to the right and walked 14 Feet. How far is she from A?

(a) 4 FT (b) 5 FT

(c) 12 FT (d) 13 FT

46) Anoop Starts walking towards South after walking 15 metres he turns towards North. After walking 20 metres he turns towards East and walks 10 metres. He then turns towards south and walks 5 metres. In which direction is he from the original position.

(a) North (b) South
(c) East (d) West

47) Manu wants to go to the market. He starts from his house towards North reaches at a crossing after 30m. He turns towards East, goes 10m till the second crossing and turns again, moves towards South straight for 30m where marketing complex exits. In which direction is the market from his house?

(a) North (b) South
(c) East (d) West

48) Madhuri moved a distance of 75 meters toward north. She then turned to the left and walking for about 25m, turned left again and walks 80m. Finally she turned to the right at an angle of 45^0 . In which direction was she moving finally?

(a) South – East
(b) South – West
(c) North – West
(d) North – East

49) (a) Eleven students A, B, C, D, E, F, G, H, I, J and K are sitting in first line facing to the teacher.
(b) D who is just to the left of F, is to the right of C at second place.
(c) A is second to the right of E who is at one end.
(d) J is the nearest neighbour of A and B and is to the left of G at third place.
(e) H is next to D to the left and is at the third place to the right of I who is just in the middle?

(a) A (b) B
(c) H (d) I

50) Five senior citizens are living in a multi-storeyed building. Mr. Manu lives a flat above Mr. Ashokan, Mr. Lokesh in a flat below Mr. Gaurav, Mr. Ashokan lives in a flat below Mr. Gaurav and Mr. Rakesh lives in a flat below Mr. Lokesh. Who lives in the top most flat?

(a) Mr. Lokesh (b) Mr. Gaurav
(c) Mr. Muan (d) Mr. Rakesh

51) Five students A, B, C, D and E are standing in a row. D is on the right of E, B is on the left of E but on the right of A. D is next to C on his left. The student in middle is

(a) B (b) E
(c) C (d) A

52) In a straight line there are six person sitting in a row? B is between F and D.E is between A and C. A does not stand next to F or D, C does not stand next to D. F is between which of the following person?
(a) B and E
(b) B and C
(c) B and D
(d) B and A

53) Pointing to a lady in the photograph, Monika said, "Her son's father is the son-in-law of my mother" How is Monika related to the lady?
(a) Aunt
(b) Sister
(c) Mother
(d) Cousin

54) Amit introduced Akash of the son of the only brother of his father's wife. How is Akash related to Amit ?
(a) Cousin
(b) Son
(c) Uncle
(d) Son-in-law

55) Pointing to a photograph of a boy Suresh said, "He is the son of the only son of my mother". How is Suresh related to that boy ?
(a) Brother
(b) Uncle
(c) Cousin
(d) Father

56) If A + B means A is the brother of B, A - B means A is the sister of B, and A x B means A is the father of B. Which of the following means that C is the son of M ?
(a) M - N x C + F
(b) F - C + N x M
(c) N + M - F x C
(d) M x N - C + F

57) Five bulbs of which three are defective are to be tried in two lights-points in a dark-room. In how many trials the room shall be lighted?
(a) 10
(b) 7
(c) 3
(d) None of these

58) The number of triangle that can be formed by choosing the vertices from a set of 12 points, seven of which lie on the same straight line, is:
(a) 185
(b) 175
(c) 115
(d) 105

59) The number of elements in range of constant function is
(a) One
(b) Zero
(c) Infinite
(d) Indetermined

60) A certain ball when dropped to the ground rebounds to $\frac{4}{5}^{th}$ of the height from which it falls; it is dropped from a height of 100 metres find the total distance it travels before finally coming to rest :

(a) 600m (b) 700m
(c) 900m (d) 200m

SECTION B: STATISTICS

61) The following data relates to the incomes of 90 persons :

Income in ₹ :	1500-1999	2000-2499	2500-2999	3000-3499
No. of Persons :	13	32	20	25

What is the percentage of persons earning more than ₹ 2,500 ?

(a) 45 (b) 50
(c) 52 (d) 55

62) Relative frequency for a particular class lies between :

(a) 0 and 1 (b) 0 and 1, both inclusive
(c) – 1 and 0 (d) – 1 and 1

63) The following frequency distribution

X :	12	17	24	36	45
F :	2	5	3	8	9

is classified as

(a) Continuous distribution
(b) Discrete distribution
(c) Cumulative frequency distribution
(d) None of the above

64) In 2000, out of total of 1,750 workers of a factory, 1,200 were members of a trade union. The number of women employed was 200 of which 175 did not belong to a trade union. In 2004, there were 1,800 employees who belong to a trade union and 50 who did not belong to trade union. Of all the employees in 2004, 300 were women of whom only 8 did not belong to the trade union. On the basis of this information, the ratio of female members of the trade union in 2000 and 2004 is :

(a) 292 : 25 (b) 8 : 175
(c) 175 : 8 (d) 25 : 292

65) The lower class boundary is :

(a) An upper limit to Lower Class Limit
(b) A lower limit to Lower Class Limit.
(c) Both (a) & (b)
(d) None of these

66) From the following data find the number class intervals if class length is given as 5.
73, 72, 65, 41, 54, 80, 50, 46, 49, 53.
(a) 6 (b) 5
(c) 7 (d) 8

67) Difference between the maximum and minimum value of a given data is called
(a) Width (b) Size
(c) Range (d) Class

68) If x and y are related by x - y - 10 = 0 and mode of x is known to be 23, then the mode of y is :
(a) 20 (b) 13
(c) 3 (d) 23

69) For a moderately skewed distribution, quartile deviation and the standard deviation are related by:
(a) S. D. = $\frac{2}{3}$ Q.D (b) S. D.= $\frac{3}{4}$ Q.D
(c) S. D.= $\frac{4}{3}$ Q.D (d) S. D.= $\frac{3}{2}$ Q.D

70) Measures of dispersion are called averages of the ____ order.
(a) 1^{st} (b) 2^{nd}
(c) 3^{rd} (d) None

71) An aeroplane flies from A to B at the rate of 500 km / hr and comes back from B to A at the rate of 700 km / hr. The average speed of the aeroplane is :
(a) 600 km / hr (b) 583.33 km / hr
(c) $100\sqrt{35}$ km / hr (d) 620 km / hr.

72) If x and y are related as 3x – 4y = 20 and the quartile deviation of x is 12, then the quartile deviation of y is :
(a) 14 (b) 15
(c) 16 (d) 9

73) Mean and S. D. of a given set of observations is 1,500 and 400 respectively. If there is an increment of 100 in the first year and each observation is hiked by 20% in 2^{nd} years, then find new mean and S.D.
(a) 1920, 480 (b) 1920, 580
(c) 1600, 480 (d) 1600, 400

74) In a class of 11 students, 3 students were failed in a test. 8 students who passed secured 10,11, 20, 15, 12, 14, 26 and 24 marks respectively. What will be the median marks of the students :
(a) 12 (b) 15
(c) 13 (d) 13.5

75) If the mean of two numbers is 30 and geometric mean is 24 then what will be these two numbers?
(a) 36 and 24
(b) 30 and 30
(c) 48 and 12
(d) None of these

76) Coefficient of variation is 80. Mean is 20. Find variance:
(a) 640
(b) 256
(c) 16
(d) 250

77) In a non - leap year, the probability of getting 53 sundays or 53 Tuesdays or 53 Thursdays is :
(a) $\frac{4}{7}$
(b) $\frac{2}{7}$
(c) $\frac{3}{7}$
(d) $\frac{1}{7}$

78) The probability of getting qualified in IIT- JEE and AIEEE by a student are respectively $\frac{1}{5}$ and $\frac{3}{5}$. The probability that the student gets qualified for one of the these tests is:
(a) $\frac{17}{25}$
(b) $\frac{22}{25}$
(c) $\frac{8}{25}$
(d) $\frac{3}{25}$

79) Three identical dice are rolled. The probability that the same number will appear on each of them is :
(a) 1/6
(b) 1/12
(c) 1/36
(d) 1

80) An article consists of two parts A and B. The manufacturing process of each part is such that probability of defect in A is 0.08 and that B is 0.05. What is the probability that the assembled product will not have any defect?
(a) 0.934
(b) 0.864
(c) 0.85
(d) 0.874

81) In how many ways can the letters of 'REGULATION' be arranged so that the vowels come at odd places?
(a) 1/252
(b) 1/144
(c) 144/252
(d) None of these

82) In how many ways a team of 5 can be made out of 7 Boys and 8 Girls, if 2 Girls are compulsory to form a Team.
(a) 2,646
(b) 1,722
(c) 2,702
(d) 980

83) The odds against A solving a certain problem are 4 to 3 and the odds in favour of B solving the same problem are 7 to 5.
What is the probability that the problem will be solved if they both try ?
(a) 15/21 (b) 16/21
(c) 17/21 (d) 13/21

84) A bag contains 6 red balls and some blue balls. If the probability of drawing a blue ball form the bag is twice that of a red ball, find the number of blue balls in the bag
(a) 10 (b) 12
(c) 14 (d) 16

85) For two events A, B let $P(A) = \frac{2}{3}$, $P(B) = \frac{3}{8}$ and $P(A \cap B) = \frac{1}{4}$ then A and B are:
(a) Mutually exclusive but not independent
(b) Independent but not mutually exclusive
(c) Mutually exclusive and independent
(d) None of these

86) The probability that a leap year has 53 Wednesday is
(a) $\frac{2}{7}$ (b) $\frac{3}{5}$
(c) $\frac{2}{3}$ (d) $\frac{1}{7}$

87) The number of calls arriving at an internal switch board of an office is 96 per hour. Find the probability that there will be:
(i) not more than 3 calls on the board, per minute.
(ii) at least three calls in a minute on the board. [Given : $e^{-1.6} = 0.2019$]
(a) 0.08 and 0.92 respectively (b) 0.19 and 0.92 respectively
(c) 0.92 and 0.13 respectively (d) 0.92 & 0.08 respectively

88) If 5% of the families in Kolkata do not use gas as a fuel, what will be the probability of selecting 10 families in a random sample of 100 families who do not use gas as fuel?
[Given : $e^{-5} = 0.0067$]
(a) 0.038 (b) 0.028
(c) 0.048 (d) 0.018

89) Examine the validity of the following:
Mean and standard Deviation of a binomial distribution are 10 and 4 respectively.
(a) Not valid (b) Valid
(c) Both (a) & (b) (d) Neither (a) nor (b)

90) If the inflexion points of a Normal Distribution are 6 and 14. Find its Standard Deviation ?
(a) 4 (b) 6
(c) 10 (d) 12.

91) 5,000 students were appeared in an examination. The mean of marks was 39.5 with a Standard Deviation 12.5 marks. Assuming the distribution to be normal, find the number of students recorded more than 60% marks.
Given: When Z = 1.64, Area of normal curve = 0.4495
(a) 1,000 (b) 505
(c) 252 (d) 2,227

92) For a normal distribution having mean = 2 and variance = 4, the fourth central moment μ_4 is:
(a) 16 (b) 32
(c) 48 (d) 64

93) Take 200 and 150 respectively as the assumed mean for X and Y series of 11 values, then dx = X – 200, dy = Y – 150, $\Sigma dx = 13$, $\Sigma dx^2 = 2667$, $\Sigma dy = 42$, $\Sigma dy^2 = 6964$, $\Sigma dx\, dy = 3943$. The value of r is:
(a) 0.77 (b) 0.98
(c) 0.92 (d) 0.82

94) The lines of regression are as follows :
$5x - 145 = -10y$; $14y - 208 = -8x$. The mean values $(\bar{x}, \bar{y})$ is :
(a) (12, 5) (b) (5, 7)
(c) (7, 12) (d) (5, 12)

95) Given : $\bar{x} = 16$, $\sigma x = 4.8$
$\bar{y} = 20$, $\sigma y = 9.6$
The coefficient of correlation between x and y is 0.6. What will be the regression coefficient of 'x' on 'y'?
(a) 0.03 (b) 0.3
(c) 0.2 (d) 0.05

96) The coefficient of correlation between two variables x and y is 0.28. Their covariance is 7.6. If the variance of x is 9, then the standard deviation of y is:
(a) 8.048 (b) 9.048
(c) 10.048 (d) 11.048

97) If the two lines of regression are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$, then the regression line of y on x is:
(a) $x + 2y - 5 = 0$ (b) $2x + 3y - 8 = 0$
(c) $x + 2y = 0$ (d) $2x + 3y = 0$

98) In Passche's index, weights are based on :
(a) Current year quantities (b) Base year quantities
(c) Weighted average prices (d) None of these

99) The index number of prices at a place in the year 2008 is 225 with 2004 as the base year then there is:
(a) average 125% increase in prices.
(b) average 225% increase in prices.
(c) average 100% increase in prices.
(d) None of the above.

100) If $\Sigma P_0Q_0 = 1360$, $\Sigma P_nQ_0 = 1900$, $\Sigma P_0Q_n = 1344$, $\Sigma P_nQ_n = 1880$, then the Laspeyre's Index Number is
(a) 0.71 (b) 1.39
(c) 1.76 (d) none.

Answer

1) B Let numbers be $2x$ and $3x$.
Therefore, $(3x)^2 - (2x)^2 = 320$
$9x^2 - 4x^2 = 320$
$5x^2 = 320$
$x^2 = 64$
$x = 8$
$\therefore$ Numbers are: $2x = 2 \times 8 = 16$
$3x = 3 \times 8 = 24$

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2) C
If $\log 2 = 0.3010$ and $\log 3 = 0.4771$
then $\log 24 = \log (2 \times 2 \times 2 \times 3)$
$= \log 2 + \log 2 + \log 2 + \log 3$
$= 3 \log 2 + \log 3$
$= 3 \times 0.3010 + 0.4771$
$= 0.9030 + 0.4771$
$= 1.3801$

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3) A

	Total no. of coins	= 23
	Ratio of ₹ 1 coin : ₹ 2 coins	= 3 : 2
let	No. of ₹ 1 coins	= 3x
	No. of ₹ 2 coins	= 2x
	No. of ₹ 5 coins	= 23 – 3x – 2x
		= 23 – 5x

Total value of all coins = 43
$3x \times 1 + 2x \times 2 + (23 - 5x)\, 5 = 43$
$3x + 4x + 115 - 25x = 43$
$-18x = 43 - 115$
$-18x = -72$
$x = \frac{-72}{-18} = 4$
No. of ₹ 1 coins = $3x = 3 \times 4 = 12$

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4) B $\log_{0.01} 10{,}000$

$\frac{\log 10{,}000}{\log 0.01}$ Since $\log_a b = \frac{\log b}{\log a}$

$\frac{\log (10)^4}{\log\left(\frac{1}{100}\right)}$ $\log a^n = n \log a$

$\frac{4 \times \log 10}{\log 1 - \log 100}$ $\log\left(\frac{b}{a}\right) = \log b - \log a$

$\frac{4 \times 1}{0 - \log (10)^2}$ $\log 10 = 1$, $\log 1 = 0$

$\frac{4}{-2 \log 10} = \frac{4}{-2 \times 1} = -2$

---

5) A $\frac{\text{Price of scooter}}{\text{Price of Moped}} = \frac{7}{9}$

Let; the price of scooter = 7x

and price of moped = 9x

According to question

$9x = 7x + 1600$

$2x = 1600$

$x = ₹\ 800$

So, price of moped = $9x = 9\ (800) = ₹\ 7200$

---

6) D Let the price of 1 radio be ₹ x and television be ₹ y.

Then, $6x + 4y = 18{,}480$ ---------- (1)

$14x + 2y = 18{,}480$ ---------- (2)

Solving (1) & (2) simultaneously :

$6x + 4y = 18{,}480$

$28x + 4y = 36{,}960$

(–) (–) (–)

$-22x = -18{,}480$

$x = 840$

When $x = 240$, $6 \times 840 + 4y = 18{,}480$

$4y = 18{,}480 - 5{,}040$

$y = \frac{13{,}440}{4} = 3{,}360$

Therefore, Price of a television is ₹ 3,360

---

7) B If one root is $2 + \sqrt{5}$, then other root will be $2 - \sqrt{5}$, because irrational roots always occur in pairs.

Now, equation will be :

$[x - (2 - \sqrt{5})]\ [x - (2 - \sqrt{5})] = 0$

$x^2 - (2 + \sqrt{5})x - (2 - \sqrt{5})x + (2 + \sqrt{5})\ (2 - \sqrt{5}) = 0$

$x^2 - 2x - \sqrt{5}x - 2x + \sqrt{5}x + (4 - 5) = 0$

$x^2 - 4x - 1 = 0$

---

8) A Let the starting salary be ₹x and the annual increment be ₹y.

Then, $x + 4y = 1500$ .....(1)

$x + 10y = 1800$ .....(2)

Subtracting (1) from (2)

$x + 10y = 1800$

$x + 4y = 1500$

(–) (–) (–)

$6y = 300$

$y = ₹50$

Substituting $y = 50$ in (1), we get $x = 1{,}300$

Therefore, starting salary = x = ₹ 1,300

Annual increment = y = ₹ 50.

---

9) B Let the speed of the river be x km/hr.

We know that speed = $\frac{\text{Distance}}{\text{Time}}$

$\Rightarrow$ Time = $\frac{\text{Distance}}{\text{Speed}}$

While going upstream, the speed of the river will reduce the speed of the boat. Hence, net speed of the boat while going upstream = (5 – x) km/hr.

Time to row upstream = $\frac{40}{5-x}$ hrs.

While going downstream, the speed of the river will increase the speed of the boat. Hence, net speed of the boat while going downstream (5 + x) km/hr.

Time to row downstream = $\frac{40}{5+x}$ hrs.

Now, go by options:

Obviously if the speed of the river is more than the speed of the boat, then rowing upstream is not possible. Therefore, we can easily rule out options (a) and (c) as the speed given in these options is more than the speed of the boat.

Option (b) → 2.5 km/hr. → If the speed of the river is 2.5 km/hr.

Time to row upstream = $\frac{40}{5-2.5} = \frac{40}{2.5}$ = 16 hrs.

Time to row downstream = $\frac{40}{5+2.5} = \frac{40}{7.5}$ = 5.33 hrs.

As per the question.

Time to row upstream = 3 × Time to row downstream

Since 16 = 3 × 5.33, option (b) is the answer.

---

10) C If one of the roots of the equation is $2+\sqrt{3}$, then other root is $2-\sqrt{3}$

$\therefore$ Sum of roots = $2+\sqrt{3}+2-\sqrt{3}=4$

Product of roots = $(2+\sqrt{3})(2-\sqrt{3}) = 4-3=1$

$\therefore$ Required equation is :

x^2 – (sum of roots) x + product of roots = 0

Or $x^2 - 4x + 1 = 0$

Now comparing with $x^2 + px + q = 0$

we get, þ = – 4 and q = 1

Required answer is (– 4,1)

---

11) C If $|x-2| + |x-3| = 7$

If $x - 2 \geq 0$ and $x - 3 \geq 0$

$(x-2) + (x-3) = 7$

$x - 2 + x - 3 = 7$

$2x = 7 + 2 + 3$

$2x = 12$

$X = 6$

If $x - 2 < 0$ & $x - 3 < 0$

$-(x-2) - (x-3) = 7$

$-x + 2 - x + 3 = 7$

$-2x = 2 \quad x = -1$

---

12) A The shaded region lies above the equation x +y = 6, therefore it is represented by the in equation x + y > 6. Similarly for the equation 2x – y = 0 since the shaded region lies to the right of the equation. Hence it is represented by the in equation 2x – y > 0.

---

13) B Let "x" & "y" be the no. of experienced and fresh hands respectively.
In this problem, the word "forbid' plays an important role.
Meaning of "Forbid" is "Not allowed"
The union forbids the employer to employ less than 2 experienced hands. That is, the union does not allow the employer to employ less than 2 experienced hands.
Therefore, the employer should employ 2 or more than 2 experienced hands.
So, we have $x \geq 2$ or $x/2 \geq 1$ ----------(1)
And also, no. of fresh persons to be employed is equal to 1
So, we have $y = 1$
In (1), replacing 1 by "y", we get $x/2 \geq y$ or $y \leq x/2$

---

14) B $x + y \leq 11, x \geq 0, y \geq 0$

---

15) A Future value of annuity due

$$= \frac{a(1+i)}{i}[(1+i)^n - 1]$$

$$= \frac{10,000}{0.08}(1+0.08)[(1+0.08)^{10} - 1]$$

$$= 1,35,000\ [1.15892500]$$

$$= ₹\ 1,56,454.875$$

$$= ₹\ 1,56,454.88 \text{ (approx.)}$$

---

16) A Let the invested sum be ₹ P.

$$\text{Amount} = P\left[1 + \frac{rt}{100}\right]$$

$$6,300 = P\left[1 + \frac{r \times 2}{100}\right]$$

$$6,300 = P\left(\frac{100 + 2r}{100}\right) \quad \text{.....(1)}$$

$$7,875 = P\left[1 + \frac{3.75 \times r}{100}\right]$$

$$7,875 = P\left(\frac{100 + 3.75r}{100}\right) \quad \text{..... (2)}$$

Dividing (2) by (1)

$$\frac{7,875}{6,300} = \frac{P\left(\frac{100 + 3.75r}{100}\right)}{P\left(\frac{100 + 2r}{100}\right)}$$

$$1.25 = P\ \frac{100 + 3.75r}{100 + 2r}$$

$125 + 2.5r = 100 + 3.75r$
$3.75r - 2.5 = 125 - 100$
$1.25\ r = 25$

$$r = \frac{25}{1.25} = 20\% \text{ p.a.}$$

---

17) A

$$\text{P.V. of outflows i.e. annuity paid} = \frac{a}{i}\left[\frac{(1+i)^n - 1}{(1+i)^n}\right]$$

$$= \frac{1250}{0.14}\left[\frac{(1+0.14)^4 - 1}{(1+0.14)^4}\right]$$

$$= 8928.57 \times 0.4079$$

$$= ₹\ 3642.14 \text{ (approx)}$$

Purchase price of machine = ₹ 4,000 Since, purchase price of machine is more than the P.V. of outflows of annuity, hence, leasing is preferable.

---

18) A

S.I. paid on money borrowed

$= \frac{Prt}{100} = \frac{5000 \times 2 \times 4}{100}$

= ₹ 400

S.I. received on money lended

$= \frac{Prt}{100} = \frac{5000 \times 25 \times 2}{4 \times 100}$

= ₹ 6.25

Total Gain in the transaction for 2 years.

= S.I. received – S.I. Paid

= ₹ 625 – ₹ 400

= ₹ 225.

Gain per year = $\frac{225}{2}$ = ₹ 112.50

---

19) D

Given R = $\frac{7}{4}$% Quarterly = 1.75%

T = 1 × 4 Quarter

= 4 Quarter

Effective Rate (E) $= \left[\left(1 + \frac{R}{100}\right)^T - 1\right] \times 100\%$

$= \left[\left(1 + \frac{1.75}{100}\right)^4 - 1\right] \times 100\%$

$= [(1 + 0.0175)^4 - 1] \times 100\%$

$= [(1.0175)^4 - 1] \times 100\%$

$= [1.07185 - 1] \times 100\%$

$= 0.0718 \times 100\%$

$= 7.18\%$

---

20) C

$A = P\left(1 + \frac{R_1}{100}\right)\left(1 + \frac{R_2}{100}\right)\left(1 + \frac{R_3}{100}\right)$

$R_1 = 9\%, R_2 = 6\%, R = 3\%, A = 550$

$550 = P\left(1 + \frac{9}{100}\right)\left(1 + \frac{6}{100}\right)\left(1 + \frac{3}{100}\right)$

$550 = P\ (1.09)\ (1.06)\ (1.03)$

$P = \frac{550}{1.09 \times 1.06 \times 1.03}$

$P = \frac{550}{1.190062} = 462.16$

---

21) A

Let the value of the scooter be ₹ x. before 3 years

Before three years,

A (scrap value after 3 year) = ₹ 7,290

R = 10% (dep Rate)

T = 3 years

$A = P\left(1 - \frac{R}{100}\right)^T$

$7,290 = x\left(1 - \frac{10}{100}\right)^3$

x = ₹ 10,000

---

22) D

The candidate can select 8 questions by selecting at least three from each part in the following ways :

(a) 3 questions from part A and 5 questions from part B

$= {}^7C_3 \times {}^5C_5 = 35$ ways

(b) 4 questions from part A and part B each

$= {}^7C_4 \times {}^5C_4 = 175$ ways.

(c) 5 questions from part A and 3 questions from part B $= {}^7C_5 \times {}^5C_3 = 210$ ways.

Hence, the total number of ways in which the candidate can select the question will be = 35 + 175 + 210 = 420 ways.

---

23) A

There are 7 letters of five different kinds C, O, (L, L), (E, E), G.
Thus, following cases arise :

(i) All the four letters are different :
The required number of combination = ${}^5C_4 = 5$.

(ii) 2 letters are alike and 2 are different; There are 2 pairs of alike letters, viz, (L, L),(E, E).One pair can be chosen in ${}^2C_1$ ways. Remaining 2 different letters can be selected from remaining different letters in ${}^4C_2$ ways. Therefore the number of combinations = ${}^2C_1 \times {}^4C_2 = 2 \times 6 = 12$

(iii) 2 Letters are alike of one kind, and 2 are alike of other kind :
Two pairs of similar letter can be chosen in ${}^2C_2 = 1$ way.

Hence, the total number of required combination is = 5 + 12 + 1 = 18 ways.

---

24) A

In word "VIOLENT"
No. of vowel = 3 (I, O, E)
No. of consonant = 4 (V, L, N, T)
Total no of letter = 7
OEOEOEO O → Odd
E → Even

There are 3 Even places and 4 Odd places so 3 vowels can fill in 3 even places and 4 consonant can fill in 4 Odd places. Then total number of ways = ${}^3P_3 \ {}^4P_4$

$= 3! \times 4!$
$= 6 \times 24$
$= 144$

---

25) C

Total Friend = 10
No. of Relative = 6
No. of Friend = 4
No. of ways to invite five guest such that three of them are his relatives.

$= {}^6C_3 \times {}^4C_2$
$= \frac{6\times5\times4}{3\times2\times1} \times \frac{4\times3}{2\times1}$
$= 20 \times 6$
$= 120$

---

26) A

No. of Total Balls = 4 Red + 3 Black + 2 white
= 9 Balls.

If 3 balls are drawn from this bag getting at least one black balls.
It may be following cases

(a) 1 B & 2 other = ${}^3C_1 \times {}^6C_2 = 3 \times 15 = 45$

(b) 2 B & 1 other = ${}^3C_2 \times {}^6C_1 = 3 \times 6 = 18$

(c) 3 B & 0 other = ${}^3C_3 \times {}^6C_0 = 1 \times 1 = 1$

Total ways = 45 + 18 + 1
= 64

---

27) B

Say, α, β are the roots of quadratic equation then as per given conditions, we have

A.M. $\Rightarrow \frac{\alpha+\beta}{2} = 8$

$\Rightarrow \alpha + \beta = 16$ (i.e. Sum of roots)

and given

G.M. $\Rightarrow \sqrt{\alpha.\beta} = 5$

$\Rightarrow \alpha.\beta = 25$ (i.e. Product of roots)

$\therefore$ required quadratic equation is :

x^2 - (Sum of roots) x + (Product of roots) = 0

$\Rightarrow x^2 - 16x + 25 = 0$

---

28) A Number b/w 100 and 1000 which are divisible by 11 are
110,121,132, ----------,990
Here, a = 110 , d= 121-110 = 11, l = 990
then, $n = \frac{l - a + d}{d} = \frac{990 - 110 + 11}{11} = \frac{891}{11} = 81$

Sum of n term of A.P.

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{81} = \frac{81}{2}[2\times110 + (81-1)11]$

$= \frac{81}{2}[220 + 80 \times 11]$

$= \frac{81}{2}[220 + 880] = 44550$

---

29) A Let, two A.M's between 68 and 260 are A_1, A_2
68, A_1, A_2,; 260

$d = \frac{b - a}{n + 1}$ Here, a = 68, n = 2, b = 260

$d = \frac{260 - 68}{2 + 1} = \frac{192}{3} = 64$

$A_1 = a + d = 68 + 64 = 132$

$A_2 = a + 2d = 68 + 2\times64 = 68 + 128 = 196$

---

30) D Let the two nos. be 'a' and 'b'

$AM = \frac{a + b}{2}$; $GM = \sqrt{ab}$

$\sqrt{ab} = 6$

$a + b = 6.5$ On Squaring

$ab = 36$ — Equation (2)

$a + b = 13$

$a = 13 - b$ — Equation (1)

Put Eq (1) in Eq (2)

$b \times (13 - b) = 36$

$13b - b^2 = 36$

$b^2 - 13b + 36 = 0$

$b^2 - 9b - 4b + 36 = 0$

$b(b-9) - 4(b-9) = 0$

$b = 9$ $b = 4$

$a = 13 - 9$ $a = 13 - 4$

$a = 4$ $a = 9$

So the two numbers are 4 and 9

---

31) C We know,

$S_n = \frac{n}{2}[2a + (n-1)d]$

$n = 5$ $S_5 = 75$

$S_5 = \frac{5}{2}[2a + (5-1)d]$

$75 = \frac{5}{2}[2a + 4d]$

$75 = \frac{5\times2}{2}[a + 2d]$

$15 = a + 2d$ — Eq (1)

$T_3 = a + (3-1)d$

$T_3 = a + 2d$

— From Eq (1)

$T_3 = 15$

---

32) A n(s) = 20,000
n(A) = 40% of 20,000 = 8,000
n(B) = 20% of 20,000 = 4,000
n(C) = 10% of 20,000 = 2,000
$n(A \cap B)$ = 5% of 20,000 = 1,000

$n(B \cap C) = 3\%$ of $20,000 = 600$

$n(C \cap A) = 4\%$ of $20,000 = 800$

$n(A \cap B \cap C) = 2\%$ of $20,000 = 400$

Now, we, have to find $n(A \cap B' \cap 'C)$

$n(A \cap B' \cap C') = n(A \cap (B \cup C))$

$= n(A \cap (B \cup C))'$

$= n(A) - n[A \cap (B \cap C)]$

$= n(A) - n(A \cap B) \cap (A \cap C))$

$= n(A) - [n(A \cap B) + n(A \cap C) - n(A \cap B \cap C)]$

$= 8,000 - (1,000 + 800 - 400)$

$= 8,000 - 1,400$

$= 6,600$

---

33) C

$f(x-1) = x^2 - 4x + 8$

$= (x^2 - 2x + 1) - 2x + 7$

$= (x-1)^2 - 2x + 2 + 7 - 2$

hence, $f(x-1) = (x-1)^2 - 2(x-1) + 5$

$\therefore f(x+1) = (x+1)^2 - 2(x+1) + 5$

$= x^2 + 2x + 1 - 2x - 2 + 5$

$= x^2 + 6 - 2$

$= x^2 + 4$

---

34) C The number of elements in range of constant function is infinite.

---

35) A

Given $f(x) = 100x$

$y = 100x$

$x = \frac{y}{100}$

$f^{-1}(y) = \frac{y}{100}$

$f^{-1}(x) = \frac{x}{100}$

---

36) D

$f(n) = f(n-1) + f(n-2)$

$f(2) = f(1) + f(0) = 1 + 0 = 1 = f(2)$

$f(3) = f(2) + f(1) = 1 + 1 = 2 = f(3)$

$f(4) = f(3) + f(2) = 2 + 1 = 3$

Similarly,

$f(7) = f(6) + f(5)$

$f(7) = [f(5) + f(4)] + [f(4) + f(3)]$

$f(7) = [f(4) + f(3) + f(4)] + (f(4) + f(3)]$

$f(7) = [3 + 2 + 3] + [3 + 2]$

$f(7) = 13$

---

37) C

$x^2 \log x$

Differentiating both sides w.r.t. x

$x^2 \frac{d}{dx}(\text{Log } x) + \log x \frac{d}{dx}(x^2)$

$x^2 \frac{1}{x} + \text{Log}x.\ 2x.$

$x + 2x \log x.$

$x(1 + 2 \log x)$

---

38) B $x = y \text{ Log } (xy)$

Differentiating both sides w.r.t x

$$\frac{d}{dx}(x) = \frac{d}{dx}[y \log (xy)]$$

$$1 = y \frac{d}{dx} \log (xy) + \text{Log } (xy) : \frac{dy}{dx}$$

$$1 = y \frac{1}{xy} \frac{d}{dx} (xy) + \text{Log } (xy) \frac{dy}{dx}$$

$$1 = \frac{1}{x}\left(\frac{xdy}{dx} + y.1\right) + \text{Log } (xy) \frac{dy}{dx}$$

$$1 = \frac{1}{x}\left(\frac{xdy}{dx} + y\right) + \text{Log } (xy) \frac{dy}{dx}$$

$$1 = \frac{dy}{dx} + \frac{y}{x} + \text{Log } (xy) \frac{dy}{dx}$$

$$1 = [1 + \text{Log } (xy)] \frac{dy}{dx} + \frac{y}{x}$$

$$[1 + \text{Log } (xy)] \frac{dy}{dx} = 1 - \frac{y}{x}$$

$$\frac{dy}{dx}(1 + \text{Log } xy) = \frac{x - y}{x}$$

$$\frac{dy}{dx} = \frac{x - y}{x(1 + \text{Log } xy)}$$

---

39) A $x^3 - 2x^2y^2 + 5x + y = 5$

Differentiating each term w.r.t x

$$3x^2 - 2\left(x^2 \frac{d}{dx}(y^2) + y^2 \frac{d}{dx}(x^2)\right) + 5 + \frac{dy}{dx} = 0$$

$$3x^2 - 2\left(x^2 2y \frac{dy}{dx} + y^2 . 2x\right) + 5 + \frac{dy}{dx} = 0$$

$$3x^2 - 4x^2 y \frac{dy}{dx} - 4xy^2 + 5 + \frac{dy}{dx} = 0$$

$$\frac{dy}{dx}(1 - 4x^2y) = 4xy^2 - 3x^2 - 5$$

$$\frac{dy}{dx} = \frac{4xy^2 - 3x^2 - 5}{1 - 4x^2y}$$

$$\left(\frac{dy}{dx}\right)_{(1,1)} = \frac{4 \times 1 \times 1^2 - 3 \times 1^2 - 5}{1 - 4 \times 1^2 \times 1}$$

$$= \frac{4 - 3 - 5}{1 - 4} = \frac{-4}{-3} = \frac{4}{3}$$

---

40) A Since the ordinate and abscissa are equal.

$\therefore x = y$

$x = \sqrt{4 - x^2}$ (Squaring both sides)

$\rightarrow x^2 = 4 - x^2$

$\rightarrow x = \sqrt{2}$

Differentiating the given equation w.r.t x

$$\frac{dy}{dx} = \frac{1(-2x)}{2\sqrt{4 - x^2}}$$

$$\frac{dy}{dx} (\text{at } x = \sqrt{2}) = \frac{-2\sqrt{2}}{2\sqrt{2}} = -1$$

---

41) A If

P	L	A	Y	and	R	H	Y	M	E
↓	↓	↓	↓		↓	↓	↓	↓	↓
8	1	2	3		4	9	3	6	7

then Code for

M	A	L	E
↓	↓	↓	↓
6	2	1	7

---

42) C

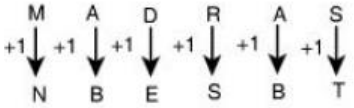
4, 12, 44, 176, 890,
$4 \times 2 + 4 = 12$
$12 \times 3 + 6 = 42$
$42 \times 4 + 8 = 176$
$176 \times 5 + 10 = 890$

---

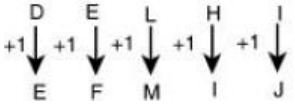
43) C

$5^2 = 25$
$7^2 = 49$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$

All the other no.'s are square of some natural no.'s except 143
So 143 is odd one out

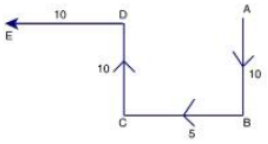


Similarly,



---

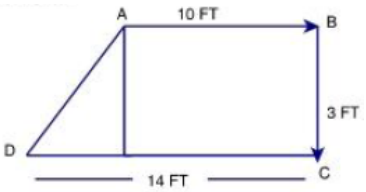
44) B



AE = DE + CB = 15

---

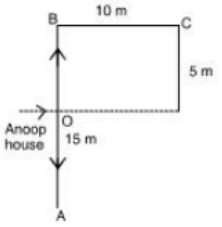
45) B



AD = 5 FT

---

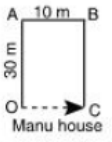
46) C



'East direction is he from the original Position'.

---

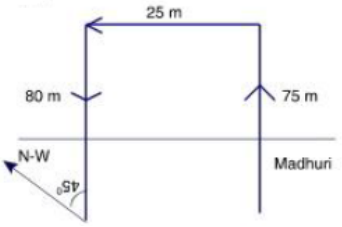
47) C



Direction is the market from his house is east.

---

48) C



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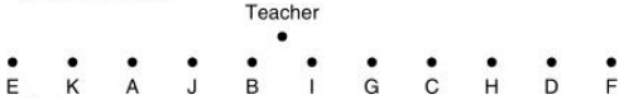
49) D

I is in the middle.



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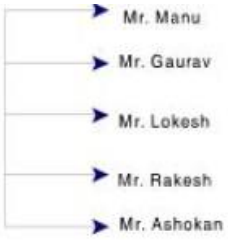
50) C



Mr. Manu lives in the top most flat.

---

51) B

The student in middle is 'E'.

---

52) D

---

53) B Lady's son's father is lady's husband. Thus Monika is a lady's sister.

---

54) A Cousin

---

55) D The boy in the photograph is the only son of the son of Suresh's mother, the son of Suresh. Hence Suresh is the father of boy.

---

56) D

M x N → M is the father of N
N - C → N is the sister of C
C + F → C is the brother of F
So M is the father of C or C is the son of M.

---

57) B Total number of trials = ${}^5C_2 = 10$ ways No. of trials for no light in the room = ${}^3C_2 = 3$

∴ The room shall be lighted in = 10 – 3 = 7 ways.

---

58) A

Here n = 12, k = 7

No. of triangle are formed from 'n' point

In which (k) points are collinear = ${}^{n}C_3 - {}^{k}C_3$

$= {}^{12}C_3 - {}^{7}C_3$

$= \frac{12 \times 11 \times 10}{3 \times 2 \times 1} - \frac{7 \times 6 \times 5}{3 \times 2 \times 1}$

$= 220 - 35$

$= 185$

---

59) C

The number of elements in range of constant function is infinite.

---

60) C

Since the ball was dropped from a height of 100 m, so it travelled 100 m first, Then, it went up to $100 \times \frac{4}{5} = 80$ m and dropped. So it travelled 2×80 m. In this way the total distance travelled would be :

$100 + 2\left[80 + 80\left(\frac{4}{5}\right) + 80\left(\frac{4}{5}\right)^2 + 80\left(\frac{4}{5}\right)^3 + \ldots\ldots\ldots\ldots\right]$

$= 100 + 2\left[\frac{80}{1 - 4/5}\right]$

[Since, sum of infinite G.P. $= \frac{a}{1-r}$

$= 100 + 2\left[\frac{80 \times 5}{5 - 4}\right]$

$= 100 + (2 \times 400)$

$= 900$ m.

---

61) B

No. of persons earning more than ₹ 2500 = 20 + 25 = 45

∴ The percentage of persons earning more than

₹ 2,500 $= \frac{45}{90} \times 100 = 50\ \%$

---

62) A

Relative frequency of a class interval is defined as the ratio of the class frequency to the total frequency. Therefore, Relative frequency for a particular class lies between 0 and 1.

---

63) B

X:	12	17	24	36	45
F:	2	5	3	8	9

is classified as Discrete distribution.

---

64) D

TITLE : Sex distribution of Trade Union and Non- union members.

Year	2000			2004		
Category	Male	Female	Total	Male	Female	Total
Member	1175	25	1200	1508	292	1800
Non-member	375	175	550	42	8	50
Total	1550	200	1750	1550	300	185

Required ratio of female members of the trade union is 2000 : 2004

= 25 : 292

---

65) B Lower class Boundary

Lower class limit $-\frac{1}{2}$(upper class limit of the class – lower class limit of the succeeding class). Therefore, lower class boundary is a lower limit to lower class limit.

---

66) D We have, Range = Maximum value – Minimum value = 80 – 41 = 39

Class length = 5

No. of class Intervals × class lengths Range

$\Rightarrow$ No. of class Intervals × 5 $\cong$ 39

$\Rightarrow$ No. of class Intervals = $\frac{39}{5} \cong 8$

(We always take the next integer as the no. of class intervals so as to include both the minimum and maximum values).

---

67) C Difference between the maximum and minimum value of given data is called **Range**.

---

68) B Mode of x = 23

$x - y - 10 = 0$

$y = x - 10$

Mode of y = Mode of x – 10

= 23 – 10

= 13

---

69) D As we know in a normal distribution

$Q_1 = u\ 0.675\ \sigma$ .....(1)

and $Q_3 = u + 0.675\ \sigma$.....(2)

Subtracting (1) from (2) we get

$\frac{Q_3 - Q_1}{2} = 0.675\sigma$

$\frac{Q.D.}{0.675} = \sigma$ [$\because$ Q. D. = $\left[\because Q.D. = \frac{(Q_3 - Q_1)}{2}\right]$

1.5 Q.D. = σ

S.D. = $\frac{3}{2} \times$ Q.D. (S.D. = σ)

---

70) B The measures of dispersion are also called averages of the second order because these measures give an average of the differences of various items from an average.

---

71) B Required average speed of the aeroplane = the harmonic mean between the two speeds.

$= \frac{2}{\frac{1}{500} + \frac{1}{700}} = \frac{2 \times 3500}{7 + 5} = 583.33$ km/hr.

---

72) D If y = a+bx, a and b being constant, then Q.D. y = |b| Q. D.x.

$3x - 4y = 20$ or $y = \frac{3}{4}x + 5$

$Q.Dy = \left(\frac{3}{4}\right) \times 12 = 9$ [Q.Dx = 12]

---

73) A $\bar{x} = 1500, \sigma = 400$

After 1st year,

Mean	S.D.
1500 + 100 = 1600	No Change

After 2nd year,

Mean	S.D.
$1600 \times \frac{20}{100} + 1600$	$400 \times \frac{20}{100} + 400$
= 1,920	= 480

---

74) A Let x_1, x_2, x_3 be the 3 students failing in test Marks of 11 students in ascending order are –

x_1, x_2, x_3, 10, 11, 12, 14, 15, 20, 24, 26

Median of discrete series $= \frac{n+1^{th}}{2}$ term

$= \frac{11+1^{th}}{2}$ term

$= 6^{th}$ term

= 12

---

75) C Let two number be a & b

A.M $= \frac{a+b}{2}$

30 $= \frac{a+b}{2}$

a + b = 60 ——— (1)

G.M $= \sqrt{ab}$

24 $= \sqrt{ab}$

ab = 576 ——— (2)

Solving (1) & (2) we get

a = 48 and b = 12

---

76) B We know,

Coefficient of variation (CV) $= \frac{S.D.}{Mean} \times 100$

Here mean = 20 ; CV = 80

$80 = \frac{S.D.}{20} \times 100$

S.D. = 16

Variance = $(S.D.)^2$

Variance = $(16)^2 = 256$

---

77) C A non leap year certain 365 days , i.e. 52 complete weeks and an additional day which may be Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, or Saturday.

Out of these 7 possible days, the favorable are Sunday, Tuesday, Thursday.

$\therefore$ Required Probability $= \frac{3}{7}$

---

78) A The probability that the student is selected for IIT JEE

$= P(E_1) = \frac{1}{5} \Rightarrow P(\bar{E}_1) \frac{4}{5}$

The probability that the student is selected for AIEEE

$= P(E_2) = \frac{3}{5} \Rightarrow P(E_2) \frac{2}{5}$

The Probability that he is selected for one of the examinations

$= 1 - p(\bar{E}_1)p(\bar{E}_2) = 1 - \frac{4}{5} \times \frac{2}{5} = \frac{17}{25}$

---

79) C The equiprobable sample space of the experiment consists of 6 × 6 × 6 sample points

Event A = same number appears on each of the three die.

= {(1, 1, 1)(2, 2, 2)(3, 3, 3)(4, 4, 4)(5, 5, 5)(6, 6, 6)}

i.e. n(A) = 6

Hence, the required probability

$= \frac{6}{6 \times 6 \times 6} = \frac{1}{36}$

---

80) D Event X : Part A is free from defect and Event Y: Part B is free from defect

$\therefore P(X) = 1 - 0.08 = 0.92$

$P(Y) = 1 - 0.05 = 0.95$

The two events X and Y are independent as part A having no defects or otherwise does not influence on part B's being defective or otherwise.

$\therefore P(X \cap Y) = P(X), P(Y) = 0.92 \times 0.95 = 0.874$

---

81) A Number of vowels = 5

Number of old places = 5

Number of ways of arranging vowels at odd places = ${}^5P_5 = 120$ ways

Remaining letters = 5

Number of ways of arranging these 5 letters in the remaining 5 places

$= {}^5P_5 = 120$ ways

Total ways = ${}^{10}P_{10} = 36,28,800$

$\therefore$ Number of ways of arranging the letters of the word 'REGULATION' so that the vowels come at odd places

$= \frac{120 \times 120}{36,28,800} = \frac{1}{252}$

---

82) C By Question : 7 Boys (B); 8 Girls (G)

Term = 5 Members (2 Girls are Compulsory)

$\Rightarrow$ Term = (3B, 2G) + (2B, 3G) + (1B, 4G) + (5G)

$= {}^7C_3 \times {}^8C_2 + {}^7C_2 \times {}^8C_3 + {}^7C_1 \times {}^8C_4 + {}^8C_5$

$= 980 + 1,176 + 490 + 56$

$= 2,702$

---

83) B The odd against A solving a certain problem = 4 : 3

$P(A)$ = Prob (solve the problem) $= \frac{3}{4+3} = \frac{3}{7}$

$P(\bar{A})$ = Prob (not solve the problem) $= \frac{4}{4+3} = \frac{4}{7}$

The odds in favour of B solving the same problem = 7 : 5

$P(B)$ = Prob (solve the problem) $= \frac{7}{7+5} = \frac{7}{12}$

$P(\bar{B})$ = Prob (not solve the problem) $= \frac{5}{7+5} = \frac{5}{12}$

Probability (Both are not solved the problem)

$= P(\bar{A} \cap \bar{B})$

$= P(\bar{A}) \cdot P(\bar{B})$

$= \frac{4}{7} \times \frac{5}{12} = \frac{5}{21}$

Probability (problem is solved) $= 1 - \frac{5}{21}$

$= \frac{16}{21}$

---

84) B Let No. of Blue ball $= x$

Red Ball $= 6$

Total Ball in a Bag $= (6 + x)$

Prob of a Red ball $P(R) = \frac{6}{6+x}$

and prob of a Blue Ball $P(B) = \frac{x}{6+x}$

Given,

$P(B) = 2P(R)$

$\frac{x}{(6+x)} = \frac{2 \times 6}{(6+x)} \Rightarrow x = 12$

---

85) B

Given $P(A) = \frac{2}{3}$, $P(B) = \frac{3}{8}$, $P(A \cap B) = \frac{1}{4}$

$P(A) \times P(B) = \frac{2}{3} \times \frac{3}{8} = \frac{2}{8} = \frac{1}{4}$

$P(A \cap B) = \frac{1}{4}$

so, $P(A \cap B) = P(A).\ P(B)$

so, A and B are Independent but not mutually exclusive.

---

86) A

In a leap years, there are 366 days.
366 days. = 52 weeks and 2 days.
2 odd days may be:

(a) Sunday and Monday
(b) Monday and Tuesday
(c) Tuesday and Wednesday
(d) Wednesday and Thursday
(e) Thursday and Friday
(f) Friday and Saturday
(g) Saturday and Sunday

No. of sample space
n(s) = 7
Event (A) = 'getting Wednesday'
n(A) = 2
P(A) = 2/7

---

87) D

Let X be the no. of calls on board. Therefore, no. of calls per hour.

i.e. $m = \frac{96}{60} = 1.6$

(i) $P(X < 3) = P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3)$

$= \frac{e^{-1.6}(1.6)^0}{0!} + \frac{e^{-1.6}(1.6)^1}{1!} + \frac{e^{-1.6}(1.6)^2}{21} + \frac{e^{-1.6}(1.6)^3}{31}$

$= e^{-1.6}\left[1 + 1.6 + \frac{(1.6)^2}{21} + \frac{(1.6)^3}{31}\right]$

$= 0.2019 \times 4.56$

$= 0.920$

(ii) $P(X \geq 3)$

$= 1 - [P(X = 0) + P(X = 1) + P(X = 2) + P(X = 3)$

$= 1 - 0.92$ (from (i))

$= 0.08$

---

88) D

Given, P = 0.05 (families who do not use gas as fuel)
No. of families in the random sample n = 100

$\therefore \quad m = np = 100 \times 0.05 = 5$

Thus, Probability of selecting 10 families in the random sample.

$P(X=10) = \frac{e^{-5}(5)^{10}}{10!}$ (Given $e^{-5} = 0.0067$)

$= \frac{0.0067.(5)^{10}}{10!} = 0.018$

---

89) A

Given : $\mu = 10$, $\sigma = 4$

As we know, mean and standard deviation of a binomial distribution are given as $\mu = n\,p$, $\sigma = \sqrt{npq}$ respectively.

$\therefore n\,p = 10$, $n\,p\,q = 16$

q = 1.6 which is not possible
since $p(x) + p(x^1) = 1$
or $p + q = 1$

---

90) A ∵ The inflexion points of a Normal Distribution are given as $(\mu + \sigma)$ and $(\mu - \sigma)$

here, we are given :

$\mu + \sigma = 14$ (1)

and, $\mu - \sigma = 6$ (2)

Solving (1) and (2) we get

$\mu = 10$ and $\sigma = 4$

Hence S.D $(\sigma) = 4$

---

91) C Probability that students recorded more than 60% marks = P $(x > 60)$

$= 1 - P(x \leq 60)$

$= 1 - P\left(\frac{x - \bar{x}}{\sigma} \leq \frac{60 - 39.5}{12.5}\right)$

$= 1 - P(Z \leq 1.64)$

$= 1 - \phi(1.64)$

$= 1 - (0.4495 + 0.5)$

$= 1 - 0.9495$

$= 0.0505$

Thus, the Number of students having marks more than 60%

$= 5000 \times 0.0505$

$= 252.5$

---

92) C For Normal Distribution Mean = 2, Variance = 4

Fourth central moments μ_4 =?

We know that Normal curve is always

Meso kuritic then $\beta_2 = 3$

moment coefficient of kurtosis

$$(\beta_2) = \frac{\mu_4}{\mu_2^2}$$

Here, μ_2 = Variance = 4, $\beta = 3$

$$3 = \frac{\mu_4}{4^2}$$

$$\mu_4 = 3 \times 4^2 = 3 \times 16 = 48$$

Shortcut: Fourth moments $\mu_4 = 3\sigma^4 = 3(4)^2 = 48$

---

93) C As we know

$$r = \frac{n\Sigma dxdy - \Sigma dx.\Sigma dy}{\sqrt{n\Sigma dx^2 - (\Sigma dx)^2}\sqrt{n\Sigma dy^2 - (\Sigma dy)^2}}$$

$$r = \frac{11 \times 3943 - 13 \times 42}{\sqrt{11 \times 2667 - (13)^2}.\sqrt{11 \times 6964 - (42)^2}}$$

$= 0.92$

---

94) D As we know, that the mean values of 2 regression equations are their points of intersection, therefore solving the equations simultaneously.

Given :

$5x - 145 = -10\bar{y}$ and $14\bar{y} - 20 = -8\bar{x}$

$\Rightarrow 5\bar{x} + 10\bar{y} = 145$ .....(1)

$8\bar{x} + 14\bar{y} = 208$ .....(2)

$\therefore 40\bar{x} + 80\bar{y} = 1160$ .....(3)

$40\bar{x} + 70\bar{y} = 1040$ .....(4)

Subtracting (4) from (3), we get:

$\bar{y} = 12$ Putting $\bar{y} = 12$ in (1), we get

$\bar{x} = 5$

$\therefore (\bar{x}, \bar{y}) = (5, 12)$

---

95) B $bxy = r \times \frac{SDx}{SDy}$

$r = 0.6$

$SDx = 4.8$

$SDy = 9.6$

$bxy = 0.6 \times \frac{4.8}{9.6} = 0.3$

---

96) B Coeff of correlation (r) = 0.28

Cov (x, y)= 7.6

Var (x) = 9

S.D. (σx) = $\sqrt{9} = 3$

S.D. of y (σy)= ?

We know that

$$r = \frac{Cov(x, y)}{\sigma x . \sigma y}$$

$$0.28 = \frac{7.6}{3 \times \sigma y}$$

$$\sigma y = \frac{760^{190}}{3 \times 0.28_{7}}$$

$\sigma v = 9.048$

---

97) A Given two Regression lines are

$x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$

$$byx = \frac{-Coeff.\ of\ x}{Coeff.\ of\ y} = \frac{-1}{2} \text{ and } bxy = \frac{-Coeff.\ of\ y}{Coeff.\ of\ x} = \frac{-3}{2}$$

Here, $byx \times bxy \leq 1$ which is satisfied.

So 1st equation $x + 2y - 5 = 0$ is the Regression Equation y on x.

---

98) A In Paasche's Index, the quantity weights of the current year are used. Therefore,

$$\text{Paasche's Index} = \frac{\Sigma P_n Q_n}{\Sigma P_o Q_n}$$

---

99) A Say, the price of base year 2004 = 100

$\therefore$ the price of current year 2008 = 225

Increase in Price = 225 – 100

= 125

$$\therefore \%\ \text{of increase in price} = \frac{\text{Increase in price}}{\text{Price of Base year}} \times 100 = \frac{125}{100} \times 100 = 125\%$$

---

100) B $\Sigma P_0 Q_0 = 1360$, $\Sigma P_n Q_0 = 1900$

$\Sigma P_0 Q_n = 1344$, $\Sigma P_n Q_n = 1880$

$$\text{Laspeyre's Index Number} = \frac{\Sigma P_n Q_0}{\Sigma P_0 Q_0}$$

$$= \frac{1900}{1360}$$

$$= 1.39$$