final CUET-2023

Comprehension:

Sutapa Chakraborty Rudyard Kipling honoured motherhood with these words: "God could not be everywhere and, therefore he made mothers." This is similar to what Sarada Devi, reffered to as Holy Mother by her disciples, would say quoting her husband, Ramalaishana Paramhansa: "He had the attitude of a mother towards all creations and he has left me behind to demonstrate this motherhood of God." That she said, was her purpose in life.

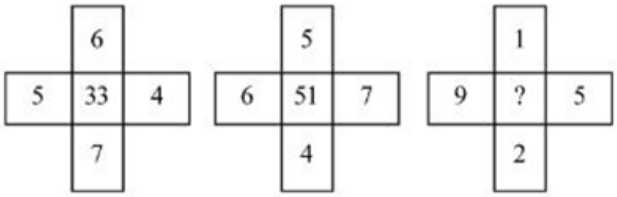
A mother's role is multifaceted. She is also her child's first teacher. And Sarada Devi fully imbibed and imparted the philosophy of 'Vieyan Vedanta', demonstrating how all those teachings could be applied to make our own lives blessed.

In her own way, she taught "as many faiths, so many paths", Brahmn, according to her, was in all things and in all creatures. Though the realised souls have imparted different teachings, and they don't say to same thing, however, since there are many paths leading to the same goal, all of their teachings are true. She gave a unique analogy for this. Imagine a tree with birds of different colours and plumage sitting and singing a wide variety of notes in varying octaves. We do not say that any one particular bird's chirp is the chirp, and the rest arc not. She would say that founders of all religions are realised souls and they have witnessed different aspects of God on the basis of their own experience, and they are all correct as they have indeed known the truth. They arc wrong in generalising it though. Actually, they arc only referring to different forms and aspects of one and the same infinite, divine reality.

Demonstrating harmony of religions in her day-to-day life and a mother's unconditional love for all, Sri Ma would say that the Muslim labourer called Amjad working for her was as much her son as was Sarat, Swami Saradrumnda, her personal attendant. When Sister Nivedita, Swami Vivekananda's disciple, came to visit her. Ma Sarada embraced and accepted her as her own daughter. She maintained that the infinite divine reality is nirgun formless, in one aspect, and also sagun, with form. Once, when asked by a monk, "Are you really the mother of all? Even the birds, insects and beasts?" She said "Yes". At her home in Jayrambati, West Bengal, when a monk once hit a cat, the Holy Mother was deeply hurt and said, "Don't beat it. Feed it so it will not steal food. I live in that cat."

Pray for desirelessness, was her advice. If one can entirely give up all wordly desires, they can get a vision of God right away, she believed. Her final and most profound teaching was that if you want peace of mind do not find faults with others. Rather, leans to see your own faults. "Leans to accept the whole world as your own. No one is a stranger, my child," she would say.

1. "God could not be every- where and therefore he made mother" who said this.
   (a) Sarada Devi
   (b) Ramakrishna Paramahansa
   (c) Rudyard Kipling
   (d) Sutapa Chakraborty
2. 'Vigyan Vedanta' philosophy could be applied to make our lives blessed. Sarada Devi fully imbibed and imparted this philosophy. Here imbibed means _____.
   (a) Kill ideas or Knowledge
   (b) Literary absorb (ideas or knowledge)
   (c) Drink (alcohol)
   (d) Absorb water
3. 'Plumage' means:
   (a) A singing bird
   (b) A bird of unique colour
   (c) A bird's feathers collectively
   (d) Number of birds chirping together
4. Who were described as Sri Ma Sharda Devi's children in the passage. The list must include all the name described:
   (a) Amjad, Sarat, Swami Vivekananda
   (b) Sarat, Swami Vivekanand
   (c) Nivedita, Amjad, Sarat
   (d) Nivedita, Swami Saradanand, Amjad, Sarat
5. Different aspects of God means:
   (a) Different nature of God
   (b) Different character of God
   (c) Different feature of God
   (d) Different identity of God Choose the most appropriate answer:
   (a) A, B only (b) A, B, C, D only
   (c) A, B, C only (d) D only
6. Choose a word opposite in the meaning of the underlined word. History is replete with deeds of cruel and capricious kings.
   (a) Erratic (b) Steady
   (c) Acquise (d) Humble
7. Find out the missing number



   (a) 40 (b) 44 (c) 46 (d) 48
8. Out of the following options select the word that is correct spelt
   (a) CONVELESENSE
   (b) CONVALASENCE
   (c) CONVALESENSE
   (d) CONVALESCENSE
9. Ajay said, "This girl is the wife of the grandson of my mother". Who is Ajay to the girl?
   (a) Father (b) Father-in-law
   (c) Cousin (d) Brother
10. The monthly income and expenditure of a person were Rs. 10,000 and Rs. 6,000 respectively. Next year, his income increased by 15% and his expenditure by 8%. Then the percentage increase in his saving is:
    (a) 20% (b) 25% (c) 25.5% (d) 52.5%
11. Despite the family's insistence that she should get married, She has get her face against the idea. The underlined idiom implies that:
    (a) She got out of the difficulty on her own
    (b) She opposed the idea with determination
    (c) She pitched herself against her parents
    (d) She refused to confront and convince her parents
12. The area of rhombus is 120 cm^2 and length of its one diagonal is 24 cm. Find the perimeter of the rhombus (in cm)
    (a) 50 (b) 52 (c) 54 (d) 56
13. Choose a synonym of the underlined word. Rohit's lugubrious eulogy at the funeral of his dog eventually made everyone start gigling.

(a) morass (b) Sonorant
(c) Meloncholy (d) Somber

14. A serve deserved punishment
(a) Reformation (b) Retribution
(c) Revisionism (d) Retreat

15. An athlete take as much time in running 200 m as a car takes in covering 500m. The distance covered by the athlete during the time the car covers 2 km is
(a) 500 m (b) 600 m
(c) 750 m (d) 800 m

16. Which player has won Gold in Women's Air pistol at the 65th National Shooting Championship, 2022?
(a) Sanskriti Bana (b) Divya T.S.
(c) Manu Bhaker (d) Rhythm Sangwan

17. Match List I with List II

List I	List II
A. Kailash Satyarthi	I. Chemistry
B. Abhijit Banerjee	II. Peace
C. Vinkatraman Ramakrishnan	III. Physics
D. Subrahmanyan Chandrasekhar	IV. Economics

(a) A-II, B-IV, C-I, D-III (b) A-IV, B-II, C-I, D-III
(c) A-II, B-IV, C-III, D-I (d) A-III, B-IV, C-I, D-II

18. Given below are two statements:
Statements:
I. Rabindranath Tagore wrote many poems.
II. Every poet has aesthetic knowledge.
III. Aesthetic is a part of axiological study.
Conclusion:
I. Rabindranath Tagore did different axiological studies.
II. He followed the base of logic and ethics.
(a) If only conclusion I follow
(b) If only conclusion II follow
(c) If either conclusion I or II follow
(c) If neither conclusion I nor II follow

19. Two boys and two girls are playing cards and are seated at North. East, South and West of a table. No boy is facing East. Persons sitting opposite to each other are not of the same sex. One girl is facing South. Which directions are the boys facing?
(a) North and West (b) East and North
(c) East and West (d) East and South

20. **Statement I :** When a ray of white light is passed through a prism, it gets splitted into its constituents colours.
This phenomenon is called dispersion of light.
Statement II : Rainbow is formed due to dispersion of sunlight by water droplets.
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both Statement I and Statement II are correct
(b) Both Statement I and Statement II are incorrect
(c) Statement I is correct but Statement II is incorrect
(d) Statement I is incorrect but Statement II is correct

21. ISRO successfully put three satellites of which country into space orbit with PSLV-C53?
(a) USA (b) Singapore
(c) Brazil (d) Spain

22. If $\cot^2 45° - \sin^2 45° = K \sin^2 30° \cdot \tan^2 45° \cdot \sec^2 45$, then the value of K is
(a) 0 (b) 1 (c) 1.5 (d) 2

23. Find the missing term in the given number series: –1, 0, 7, 26, 63, ?, 215, 342, ...
(a) 172 (b) 142 (c) 124 (d) 134

24. A sum of money doubles itself on simple interest in 10 years. Find the rate of interest annum.
(a) 10% (b) 12% (c) 12.5% (d) 8%

25. Who has been awarded the first prize in the National MSME Award 2022?
(a) Assam (b) Odisha
(c) Gujarat (d) Uttar Pradesh

26. Which of the following is true :
A. Two vectors are said to be identical if their difference is zero.
B. Velocity is not a vector quantity.
C. Projection of one vector on another is not an application of dot product.
D. The maximum space rate of change of the function which is increasing direction of line function is known as gradient of scalar function.
Choose the most appropriate answer from the options given below :
(a) B and C only (b) A and C only
(c) A and D only (d) B and D only

27. The unit vectors orthogonal to the vector $-\hat{i}+2j+2k$ and making equal angles with the x and y axis is (are)
(a) $\pm\frac{1}{3}\left(2\hat{i}+2j-2k\right)$ (b) $\pm\frac{1}{3}\left(\hat{i}+j-k\right)$
(c) $\pm\frac{1}{3}\left(2\hat{i}-2j-2k\right)$ (d) $\pm\frac{1}{3}\left(\hat{i}-2j-2k\right)$

28. Which of the following is a correct definition of volatile memory
(a) It does not retain its contents at high temperature
(b) It is to be kept in air tight box
(c) If loses its contents on failure of power supply
(d) It does not lose its content on failure of power supply

29. Match List I with List II

List I	List II
A. Dog : Rabies : : Mosquito :	I. Bacteria
B. Amnesia : Memory : : Paralysis :	II. Liver
C. Meningitis : Brain : : Cirrhosis :	III. Movement
D. Influenza : Virus : : Typhoid :	IV. Malaria

(a) A-II, B-III, C-I, D-IV
(b) A-III, B-IV, C-II, D-I
(c) A-IV, B-III, C-II, D-I
(d) A-IV, B-III, C-I, D-II

30. Given below are two statements :
Statement I : If the roots of the quadratic equation $x^2 - 4x - \log_3 a = 0$ are real, then the least value of a is 1/81.
Statement II : The harmonic mean of the roots of the equation $\left(5+\sqrt{2}\right)x^2-\left(4+\sqrt{5}\right)x+\left(8+2\sqrt{5}\right)=0$ is 2.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both Statement I and Statement II are true
(b) Both Statement I and Statement II are false
(c) Statement I is true but Statement II is false
(d) Statement I is false but Statement II is true

31. Consider the expression (a – 1) * (((b + c) / 3) + d). Let x be the minimum number of registers required by an optimal code generation (without any register spill) algorithm for a load/store architecture in which
(i) Only load and store instructions can have memory operands and
(ii) Arithmetic instructions can have only register or immediate operands. The value of x is _____.
(a) 2 (b) 4 (c) 1 (d) 3

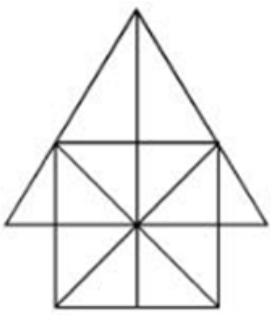
32. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A: If $a \neq b$ then $(a, b) \neq (b, a)$
Reason R: (4, –3) lies in quadrant IV.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true.

33. Let E be the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$ and C be the circle $x^2 + y^2 = 9$. Let P and Q be the points (1, 2) and (2, 1) respectively. Then
(a) Q lies inside C but outside E
(b) Q lies outside both C and E
(c) P lies inside both C and E
(d) P lies inside C but outside E

34. A straight line has equation $y = – x + 6$ which of the following line is parallel to it?
(a) $2y + 3x = –5$ (b) $–3x –3y + 7 = 0$
(c) $2y = –x + 12$ (d) $y - x = \frac{1}{10}$

35. A. If A and B are two invertible matrices, then $(AB)^{-1} = A^{-1}B^{-1}$
B. Every skew symmetric matrix of odd order is invertible
C. If A is non-singular matrix, then $(A^T)^{-1} = (A^{-1})^T$
D. If A is an involutory matrix, then $(I + A)(I – A) = 0$
E. A diagonal matrix is both an upper triangular and a lower triangular
Choose the correct answer from the options given below:
(a) A, B, C, E only (b) B, D, E only
(c) A, D, E only (d) C, D, E only

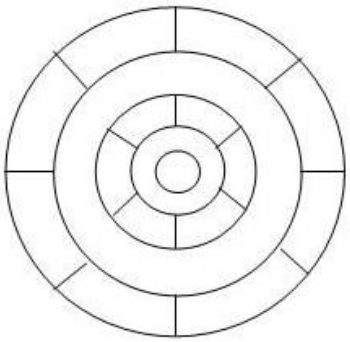
36. Count the number of triangles and square in the given figure.



(a) 26 triangles, 5 squares (b) 28 triangles, 5 squares
(c) 26 triangle, 6 square (d) 28 triangles, 6 squares

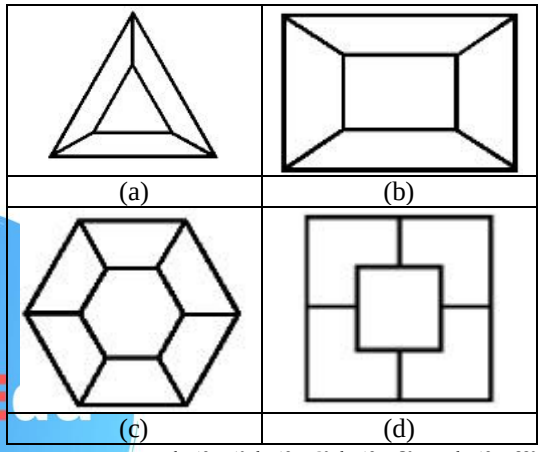
37. The amount of time required to read a block of data from a disk into memory is composed of seek time, rotational latency and transfer time. Rotational latency refers to
(a) the time its taken for the platter to make a full rotation
(b) the time its taken for the read-write head to more into position over the appropriate track
(c) the time it taken for the platter to rotate the correct sector under the head
(d) to reduce number of bits in the field of instruction.

38. Consider the adjoining diagram : What is the minimum number of different colours required to paint the figure such that no two adjacent regions have same colour?



(a) 3 (b) 4 (c) 5 (d) 6

39. Choose the figure that which is different from the rest?



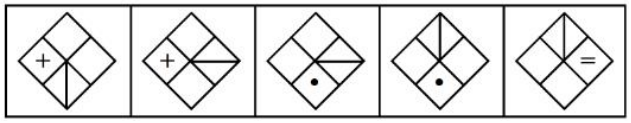
40. The value of $e^{\log 10 \tan 1° + \log 10 \tan 2° + \log 10 \tan 3° + ... + \log 10 \tan 89°}$ is
(a) 0 (b) e (c) 1/e (d) 1

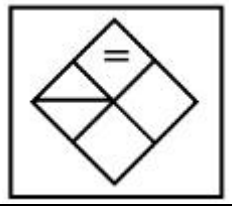
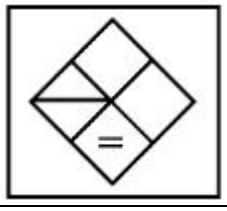
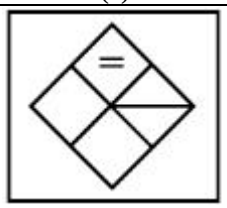
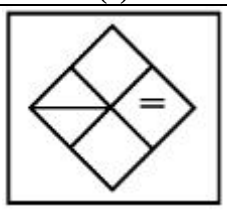
41. If $\vec{a} = 2\hat{i} + 2j + 3k$, $\vec{b} = -\hat{i} + 2j + k$ and $\vec{c} = 3\hat{i} + j$ are such that $\vec{a} + \gamma\vec{b}$ is perpendicular $\vec{c}$ then determine the value of γ?
(a) 3 (b) 0 (c) 4 (d) 8

42. A. If $(12P)_3 = (123)_P$, then value of P is infeasible.
B. The simplified sum of product from of the Boolean expression is $\left(P+\overline{Q}+\overline{R}\right).\left(P+\overline{Q}+R\right).\left(P+Q+\overline{R}\right)$ is $\left(P+\overline{Q}R\right).$
C. The minimum number of D flip-flops needed to design a mod(258) counter is 8.
Choose the correct answer from the options given below:
(a) A only (b) A and B only
(c) A and C only (d) C only

43. If the unit vectors $\vec{a}$ and $\vec{b}$ are inclined at an angle 2θ such that $\left|\vec{a}-\vec{b}\right|<1$ and $0 \le \theta \le \pi$, then θ lies in the interval.
(a) $\left[0, \frac{\pi}{2}\right]$ (b) $\left[\frac{5\pi}{6}, \pi\right]$
(c) $\left[\frac{\pi}{6}, \frac{\pi}{2}\right]$ (d) $\left[\frac{\pi}{2}, \frac{5\pi}{6}\right]$

44. Which of the following will be the next figure in sequence.



	
(a)	(b)
	
(c)	(d)

45. Match List I with List II

List I

A. The angle between the straight lines, $2x^2 + 3y^2 - 7xy = 0$

B. The circle $x^2 + y^2 + x + y = 0$ and $x^2 + y^2 + x - y = 0$ intersect at angle.

C. The area of circle centered at (1, 2) and passing through (4, 6)

D. The parabolas $y^2 = 4x$ and $x^2 = 32y$ intersect at point (16, 8) at angle.

List II

I. $\tan^{-1}\frac{3}{5}$

II. 25π

III. $\frac{\pi}{4}$

IV. $\frac{\pi}{2}$

(a) A-IV, B-III, C-I, D-II (b) A-IV, B-III, C-II, D-I
(c) A-III, B-IV, C-II, D-I (d) A-III, B-IV, C-I, D-II

46. Let $\alpha = \cos\frac{2\pi}{7} + i\sin\frac{2\pi}{7}$, $\alpha = a + a^2 + a^4$ and $\beta = a^3 + a^5 + a^6$ then the equation whose roots are α, β is
(a) $x^2 + x + 2 = 0$ (b) $x^2 + x - 2 = 0$
(c) $x^2 - x - 2 = 0$ (d) $x^2 - x + 2 = 0$

47. A RAM chip has a capacity of 1024 words of 8 bits each (1k × 8). The number of 2 × 4 decoders with enable line needed to construct a 16 k × 16 RAM from 1 k × 8 RAM is _____.
(a) 5 (b) 4 (c) 7 (d) 6

48. A triangle with vertices (4, 0), (–1, –1), (3, 5) is
(a) Isosceles and right angled
(b) Isosceles but not right angled
(c) Right angled but not isosceles
(d) Neither right angled nor isosceles

49. Given below are two statements : One is labeled as Assertion A and the other is labelled as Reason R.
Assertion A : If the A.M. and G.M. between two numbers are in the ratio m : n, then the numbers are in the ratio $m+\sqrt{m^2-n^2} : m-\sqrt{m^2-n^2}$
Reason R : If each term of a G. P. be raised to the same power, the resulting sequence also forms a G.P.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

50. Observe the following premises and select the correct conclusion :
Major premise : All engineers are innovative
Minor premise : All students are engineers.
Conclusions :
(a) All innovative are students
(b) All students are innovative
(c) No innovative are students
(d) No engineers are students

51. Given below are two statements :
Statement I : The number of different number each of 6 digits that can be formed by using all the digits 1, 2, 1, 0, 2, 2 is 50.
Statement II : These are 4536 possibilities of writing the four digit numbers which have all distinct digits.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both Statement I and Statement II are true
(b) Both Statement I and Statement II are false
(c) Statement I is true but Statement II is false
(d) Statement I is false but Statement II is true

52. If each of n numbers $x_i = i$ replaced by $(i + 1)x_i$, then the new mean is
(a) $\frac{(n+1)(n+2)}{n}$ (b) n + 1
(c) $\frac{(n+1)(n+2)}{3}$ (d) $\frac{(n+1)(5n+4)}{6}$

53. The moment of the couple formed by the forces $5\hat{i}+k$ and $-5\hat{i}-k$ acting at the point (9, –1, 2) and (3, –2, 1) respectively, is
(a) $11\hat{r}-j+5k$ (b) $-\hat{i}+11j-5k$
(c) $-\hat{i}+11j+5k$ (d) $\hat{i}-j-5k$

54. Find the missing term in the given series: 4, 10, ?, 82, 244, 730.
(a) 24 (b) 28 (c) 77 (d) 218

55. The number of 1's in the binary representation of (3 * 4096 + 15 * 256 + 5 * | 16 + 3) is
(a) 8 (b) 9 (c) 10 (d) 12

56. The two adjacent sides of a circle QUADRILATERAL are 2 and 5 and the angle between them is 60°. If the third side is 3, the remaining fourth side is
(a) 2 (b) 3 (c) 4 (d) 5

57. If f and g are differentiable functions in (0, 1) satisfying f(0) = 2 = g(1), g(0) = 0 and f(1) = 6, then for some $c \in]0,1[$.
(a) 2f '(c) = g '(c) (b) 2f '(c) = 3g '(c)
(c) f '(c) = g '(c) (d) f '(c) = 2g '(c)

58. If A, B and C are acute positive angles such that A + B + C = π and cot A cot B cot C = K, then
(a) $K \le \frac{1}{3\sqrt{3}}$ (b) $K \ge \frac{1}{3\sqrt{3}}$
(c) $K < \frac{1}{9}$ (d) $K > \frac{1}{3}$

59. If $\oplus$ and $\square$ denote the exclusive OR and exclusive NOR operations, respectively, then which one of the following is not correct?
(a) $\overline{P \oplus Q} = P \square Q$ (b) $\overline{P} \oplus Q = P \square Q$
(c) $\overline{P} \oplus \overline{Q} = P \oplus Q$

(d) $\left(P \oplus \overline{P}\right) + Q = \left(P \square \overline{P}\right) \square \overline{Q}$

60. Given below are two statements :
Statement I : The angle between the vectors $2\hat{i}+3j+k$ and $2\hat{i}-j-k$ is $\frac{\pi}{2}$.
Statement II : The vector $\vec{a}\times\left(\vec{b}\times\vec{c}\right)$ is coplanar with $\vec{a}$ and $\vec{b}$.
In the light of the above statements, choose the correct answer from the options given below:
(a) Both Statement I and Statement II are true
(b) Both Statement I and Statement II are false
(c) Statement I is true but Statement II is false
(d) Statement I is false but Statement II is true

61. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : $f(x) = \tan^2 x$ is continuous at $x = \pi/2$
Reason R : $g(x) = x^2$ is continuous at $x = \pi/2$
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

62. If w, x, y, z are Boolean variables, then which of the following is incorrect?
(a) $wx + w(x + y) + x(x + y) = x + wy$
(b) $\overline{w}\overline{x}+\left(y+z\right)+\overline{w}x = \overline{w}+x+\overline{y}z$
(c) $\left(w\overline{x}\left(y+x\overline{z}\right)+\overline{w}\overline{x}\right)y = x\overline{y}$
(d) $(w + y)(wxy + wyz) = wxy + wyz$

63. A circle S passes through the point (0, 1) and is orthogonal to the circles $(x - 1)^2 + y^2 = 16$ and $x^2 + y^2 = 1$. Then
(a) Radius of S is 8 (b) Radius of S is 7
(c) Centre of S is (–7, 1) (d) Centre of S is (–8, 1)

64. Given below are two statements:
Statement I: $\int_{-a}^{a} f(x)\,dx = \int_{0}^{a}\left[f(x)+f(-x)\right]dx$
Statement II: $\int_{0}^{1}\sqrt{(1+x)\left(1+x^3\right)}\,dx$ is less than or equal to 15/8.
In the light of the above statements, choose the most appropriate answer from the options given below:
(a) Both Statement I and Statement II are true
(b) Both Statement I and Statement II are false
(c) Statement I is true but Statement II is false
(d) Statement I is false but Statement II is true

65. The point(s) at which function f is given by $f(x) = \begin{cases} \frac{x}{|x|}; & x < 0 \\ -1; & x \geq 0 \end{cases}$ is continuous is/are
(a) $x \in R$ (b) $x = 0$
(c) $x \in R \setminus \{0\}$ (d) –I and I

66. If every pair from among the equation $x^2 + px + qr = 0$, $x^2 + qx + rp = 0$ and $x^2 + rx + pq = 0$ has a common root, then the product of three common root is _____.
(a) pqr (b) 2pqr (c) $p^2 q^2 r^2$ (d) $p^2 qr^2$

67. The top of a hill observed from the top and bottom of a building of height h is at angles of elevation p and q respectively. The height of the hill is:
(a) $\frac{h\cot q}{\cot q - \cot p}$ (b) $\frac{h\cot p}{\cot p - \cot q}$
(c) $\frac{h\tan p}{\tan p - \tan q}$ (d) $\frac{h\sec p}{\tan p - \tan q}$

68. Each of the angle between vectors $\vec{a},\vec{b}$ and $\vec{c}$ is equal to 60°. If $|\vec{a}| = 4, |\vec{b}| = 2$ and $|\vec{c}| = 6$ then the modulus of $\vec{a}+\vec{b}+\vec{c}$ is .....
(a) 10 (b) 15 (c) 12 (d) 20

69. Match List I with List II
List I
A. Addition Theorem of probability
B. Binomial distribution
C. Baye's rule
D. Multiplication theorem on probability
List II
I. $P\left(Ei/A\right) = \frac{P(Ei)P(A/Ei)}{\sum_{1=1}^{n} P(Ei)P(A/Ei)}, i = 1, 2$
II. $P(A \cap B) = P(A)P\left(B/A\right)$, if $P(A) \neq 0$
III. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
IV. $P(x = r) = {}^nC_r\, p^r q^{n-r}$, r = 0, 1, ……, n
Choose the correct answer from the options given below:
(a) A-III, B-IV, C-I, D-II (b) A-III, B-IV, C-II, D-I
(c) A-III, B-II, C-IV, D-I (d) A-III, B-I, C-IV, D-II

70. For $0 < \theta < \frac{\pi}{2}$, the solution(s) of $\sum_{m=1}^{6} \operatorname{cosec}\left(\theta+(m-1)\frac{\pi}{4}\right)\operatorname{cosec}\left(\theta+\frac{m\pi}{4}\right) = 4\sqrt{2}$ is/are
(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{6}$ (C) $\frac{\pi}{12}$ (D) $\frac{5\pi}{12}$
Choose the correct answer from the options given below:
(a) A and B only (b) C and D only
(c) A and C only (d) B and D only

71. Match List I with List II
LIST I
A. No. of triangles formed using 5 points in a line and 3 points on parallel line is
B. No. of diagonals drawn using the vertices of an octagon
C. The no. of diagonals in a regular polygon of 100 sides is
D. A polygon with 35 diagonals has sides
LIST II
I. 20
II. 10
III. 45
IV. 4850

Choose the correct answer from the options given below:
(a) A-I, B-II, C-III, D-IV (b) A-II, B-III, C-I, D-IV
(c) A-III, B-IV, C-I, D-II (d) A-III, B-I, C-IV, D-II

72. Match List I with List II

LIST I	LIST II
A. Value of $\lim_{x\to 0}\left(\frac{\sin x}{x}\right)^{\frac{\sin x}{x-\sin x}}$ is	I. e^3
B. Value of is $\lim_{x\to 0}\int_0^x \frac{\sin t^2 dt}{x^2}$ is	II. 0
C. Value of $\lim_{x\to 0}\left(e^{2x}+x\right)^{\frac{1}{x}}$ is	III. 1
D. Value $\lim_{x\to 0}\frac{\log(x-a)}{\log\left(e^x-e^a\right)}$ of	IV. e^{-1}

Choose the correct answer from the options given below:
(a) A-II, B-III, C-I, D-IV
(b) A-II, B-IV, C-III, D-I
(c) A-IV, B-II, C-III, D-I
(d) A-IV, B-II, C-I, D-III

73. Match List I with List II

LIST I	LIST II
A. 8 : 81 : : 64 : ?	I. 290
B. 182 : ? : : 210 : 380	II. 132
C. 42 : 56 : : 110 : ?	III. 342
D. 48 : 122 : : 168 : ?	IV. 625

Choose the correct answer from the options given below:
(a) A-II, B-I, C-IV, D-III (b) A-III, B-II, C-I, D-IV
(c) A-II, B-III, C-IV, D-I (d) A-IV, B-III, C-II, D-I

74. Which of the following is true :
A. If a cos A = b cos B, then the triangle is isosceles or right angled.
B. If in a triangle ABC. cos A cos B + sin A sin B sin C =1 then the triangle is isosceles right angled.
C. If the ex-radii r_1, r_2, r_3 of Δ ABC are in the HP, then it's sides are not in AP
Choose the correct answer from the options given below :
(a) A and B only (b) B and C only
(c) B and C only (d) B only

75. Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : If dot product and cross product of $\vec{A}$ and $\vec{B}$ are zero, it implies that one of the vector $\vec{A}$ and $\vec{B}$ must be null vector
Reason R : Null vector is a vector with a zero magnitude.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

76. If A, B, and C are any three sets, then
(A) A – (B ∩ C) = (A ∩ B) - (A ∩ C)
(B) A - (B ∪ C) = (A – B) ∩ (A – C)
(C) n (A - B) = n (A) – n (A ∩ B)
(D) A ∩ (B – C) = (A ∩ B) ∩ (A - C)
Choose the most appropriate answer from the options given below:
(a) A, B, C only (b) B, C, D only
(c) C, D only (d) B, C only

77. Match List I with List II

LIST I	LIST II
A. $\left\|\vec{A}+\vec{B}\right\| = \left\|\vec{A}-\vec{B}\right\|$	I. 45°
B. $\left\|\vec{A}\times\vec{B}\right\| = \vec{A}.\vec{B}$	II. 30°
C. $\left\|\vec{A}.\vec{B}\right\| = \frac{AB}{2}$	III. 90°
D. $\left\|\vec{A}\times\vec{B}\right\| = \frac{AB}{2}$	IV. 60°

Choose the correct answer from the options given below:
(a) A-III, B-I, C-IV, D-II
(b) A-III, B-II, C-IV, D-IV
(c) A-III, B-I, C-II, D-IV
(d) A-II, B-I, C-III, D-IV

78. If, x, y, z are all distinct and $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$,
then the value of xyz is
(a) –2 (b) –1 (c) –3 (d) 0

79. These are eight members in the family. Bravo and Priya are siblings. Angel is Kajal's grand daughter, Kajal who is Priya's mother-in-law. Ziva is a married woman and is older than Tim. Tim is the son of Sam who is the brother-in-law of Bravo. Smith is the eldest male in the family. Angel is not Ziva's daughter. So how is Bravo related to Ziva?
(a) Son (b) Husband
(c) Brother-in-law (d) Son-in-law

80. Find out the trend and choose the missing character from given alternative.

2	5	10
17	?	37
50	65	82

(a) 20 (b) 26 (c) 27 (d) 32

81. The number of possible Boolean functions that can be defined for n Boolean variables over n–valued Boolean algebra is _____.
(a) n^{2^n} (b) $2^{n^2} f$ (c) 2^{2^n} (d) n^{n^n}

82. The tangent to the hyperbola $x^2 - y^2 = 3$ are parallel to the straight line 2x + y + 8 = 0 at the following points:
(a) (2, 2), (1, 2) (b) (2, –1), (–2, 1)
(c) (–2, –1), (1, 2) (d) (–2, –1), (–1, –2)

83. The mean deviation from the mean of the AP a, a + d, a + 2d, ... a + 2nd is
(a) n(n + 1)d (b) $\frac{n(n+1)d}{2n+1}$
(c) $\frac{n(n+1)d}{2n}$ (d) $\frac{n(n-1)d}{2n+1}$

84. Given below are two statements : One is lebelled as Assertion A and the other is labelled as Reason R.
Assertion A: $\int_{-3}^{3}\left(x^3+5\right)dx = 30$
Reason R : $f(x) = x^3 + 5$ is an odd function
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false

(d) A is false but R is true

85. Given below are two statements : One is lebelled as Assertion A and the other is labelled as Reason R.
Assertion A : The number of parallelograms in a chess board is 1296.
Reason R : The number of parallelograms when a set of m parallel lines is intersected by another set of n parallel lines is ${}^{n}C_2 \cdot {}^{n}C_2$.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

86. A person goes in for an examination in which there are four papers with a maximum of m marks from each paper. The number of ways in which one can get 2m marks is
(a) $\frac{1}{3}(m+1)\left(2m^2+4m+1\right)$
(b) $\frac{1}{3}(m+1)\left(2m^2+4m+2\right)$
(c) $\frac{1}{3}(m+1)\left(2m^2+4m+3\right)$
(d) ${}^{2m+3}C_3$

87. The H.M. of two numbers is 4 and the arithmetic mean A and geometric mean G satisfy the relation $2A + G^2 = 27$, the numbers are
(a) 6, 3 (b) 5, 4 (c) 5, –25 (d) –3, 1

88. Given the following binary number in 32 - bit (single precision) IEEE-754 format :
0011 1110 0110 1101 0000 0000 0000 0000
The decimal value closest to this floating point number is
(a) 1.45×10^{1} (b) 1.45×10^{-1}
(c) 2.27×10^{-1} (d) 2.27×10^{1}

89. If A_1, A_2 be two AM's and G_1,G_2 be two GM's between a and b, then $\frac{A_1+A_2}{G_1G_2}$ is equal to
(a) $\frac{a+b}{2ab}$ (b) $\frac{2ab}{a+b}$ (c) $\frac{a+b}{ab}$ (d) $\frac{a+b}{\sqrt{ab}}$

90. If the curve $ay + x^2 = 7$ and $x^3 = y$.cut orthogonally at (1, 1) then the value of a is
(a) 1 (b) 6 (c) –6 (d) 0

91. Given below are two statements : One is lebelled as Assertion A and the other is labelled as Reason R.
Assertion A : An elevator starts with in passengers and stops at n floors ($m \le n$). The probability that no two passengers alight at the same floor is $\frac{{}^{n}P_m}{m^n}$.
Reason R : If (n + 1) p is an integer, say m, then $P(x = r) = {}^{n}C_r\, p^{\Omega}\, (1-p)^{m-\Omega}$ is maximum when r = m or r =m –1
In the light of the above statements, choose the most appropriate answer from the options given below :
(a) Both A and R are correct and R is the correct explanation of A
(b) Both A and R are correct but R is not the correct explanation of A
(c) A is correct but R is not correct
(d) A is not correct but R is correct

92. If $f : R \to R$ defined as of $f(x) = x^2 + 1$ then minimum value of f(x) is
(a) 4 (b) 3 (c) 2 (d) 1

93. A 32 bit wide main memory with a capacity of 1 GB is built using 256 m × 4 bits DRAM chips. The number of rows memory cells in the DRAM chip is 2^{14}. The time taken to perform one refresh operation is 50 nanoseconds. The refresh period is 2 milli seconds. The percentage (rounded to the closest integer) of the time available for performing the memory read/write operations in the main memory unit is _____.
(a) 56 (b) 59 (c) 54 (d) 61

94. Given below are two statements : One is lebelled as Assertion A and the other is labelled as Reason R.
Assertion A : If two circles intersect at two points, then the line joining their centres is perpendicular to the common chord.
Reason R : The perpendicular bisectors of two chords of a circle intersect at its centre.
In the light of the above statements, choose the correct answer from the options given below :
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true but R is not the correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

95. If sinβ is the GM between sinα and cosα, then cos 2β is equal to
(a) $2\sin^2\left(\frac{\pi}{4}-\alpha\right)$ (b) $2\cot^2\left(\frac{\pi}{4}-\alpha\right)$
(c) $2\cos^2\left(\frac{\pi}{4}-\alpha\right)$ (d) $2\sin^2\left(\frac{\pi}{4}+\alpha\right)$

96. If a chord which is normal to the parabola $y^2 = 4ax$ at one end subtends a right angle at the vertex, then its slope is
(a) 1 (b) 3 (c) $\sqrt{2}$ (d) 2

97. If n_1, n_2 are two unit vectors and θ is the angle between them, then $\cos\frac{\theta}{2}$ is equal to
(a) $\frac{1}{2}\left|n_1+n_2\right|$ (b) $\frac{1}{2}\left|n_1-n_2\right|$
(c) $\frac{1}{2}\left|n_1.n_2\right|$ (d) $\frac{1n_1 \times n_2}{2\left|n_1\right|\left|n_2\right|}$

98. A 2's - complement adder - subtracter can add or subtract binary numbers. Sign-magnitude numbers represent _____ decimal numbers, and 2's complements stand for _____ decimal numbers.
(a) hexa, sign (b) sign, hexa
(c) positive, negative (d) negative, positive

99. If each observation of Row data whose variance is σ^2 is multiplied by h, then the variance of the new set is
(a) σ^2 (b) $h^2\sigma^2$ (c) $h\sigma^2$ (d) $h + \sigma^2$

100. Which of the following functions is differentiable at x = 0?
(a) cos (|x|) + |x| (b) cos (|x|) - |x|
(c) sin (| x |) + |x| (d) sin (| x |) - | x |

CUET-2023 ANSWER KEY

1	2	3	4	5	6	7	8	9	10
c	b	a	d	b	b	d	d	b	c
11	12	13	14	15	16	17	18	19	20
b	b	c	b	d	b	a		a	a
21	22	23	24	25	26	27	28	29	30
b	b	c	a	b	c	w	c	d	c
31	32	33	34	35	36	37	38	39	40
	b	d	b	d	d	c	a	d	d
41	42	43	44	45	46	47	48	49	50
d	a	b	d	c	a	a	a	b	b

51	52	53	54	55	56	57	58	59	60
a	c	d	b	c	a	d	a	d	c
61	62	63	64	65	66	67	68	69	70
d	c	bc	c	a	a	b	a	a	c
71	72	73	74	75	76	77	78	79	80
d	d	d	a	a	b	a	b	b	b
81	82	83	84	85	86	87	88	89	90
c	b	b	c	a	c	a	c	c	c
91	92	93	94	95	96	97	98	99	100
b	d	b	b	a	c	a	c	b	d

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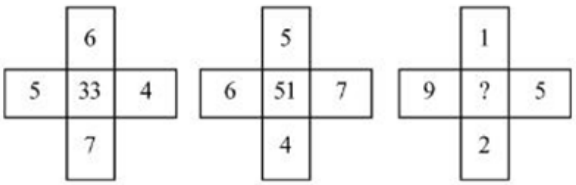
7. **Ans. (d)**



$5 \times 4 + 6 + 7$ $6\times7+5+4$ Similarly
$20+6+7$ $42+9$ $9\times5+1+2$
$= 33$ $= 51$ $45+1+2$
$= 48$

8. **Ans. (d)** Correct spelling is - CONVALESCENCE

9. **Ans. (b)** Father in law
The grandson of Arun is mother means either the son or nephew of Arun. Therefore Arun is the father in law of the girl.

10. **Ans. (c)**

Income	Expenditure	Saving
10000	6000	4000
15% |	8% |	↓
11500	6480	5020

Change in saving $= \frac{1020}{4000} \times 100 = 25.5\%$

12. **Ans. (b)** A = 120 cm^2

D_1 (diagonal) = 24 cm Area $= \frac{1}{2} \times d_1 \times d_2$

d_2 (diagonal) = x $120 = \frac{1}{2} \times 24 \times x$

Perimeter = 4a $\frac{120 \times 2}{24} = x$

x = 10 cm

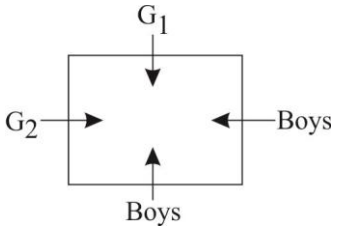
$d_1 = 24$ cm
$d_2 = 10$ cm

$a = \sqrt{12^2 + 5^2} = \sqrt{144+25} = \sqrt{169} = 13$ cm

15. **Ans. (d)**

Athlete	Car
200 m	500 m
× 4 (	) × 4
800 m	2000 m

19. **Ans. (a)** 2 Girls – G_1 and G_2
2 Boys – B_1 and B_2



(a) Boys are facing in North and West.

20. **Ans. (a)** **Statement 1:** When a white light ray passes through a prism it disperses into seven different colours, and this phenomenon is called dispersion. Both statement 1 and statement 2 are correct

22. **Ans. (c)** $\cot^2 45° - \sin^2 45° = K \sin^2 30° \cdot \tan^2 45° \cdot \sec^2 45°$

$$1 - \left(\frac{1}{\sqrt{2}}\right)^2 = K.\left(\frac{1}{2}\right)^2.(1)^2\left(\sqrt{2}\right)^2$$

$$\frac{1}{2} = K.\frac{1}{4}.2 \Rightarrow \frac{1}{2} = \frac{K}{2} \Rightarrow K = 1$$

23. **Ans. (c)**

-1,	0,	7,	26,	63	-	21 5	34 2
	1^3-1	2^3-1	3^3-1	4^3-1	**5^3-1**	6^3-1	7^3-1

$\therefore 5^3 - 1$
$125 - 1 = 124$ $125 - 1 = 124$

24. **Ans. (a)**
100 200
P A
t = 10 yr
I = A – P
= 200 – 100
= 100 Rs.
I = Rt
100 = R × 10
$\frac{100}{10} = R$
$\therefore$ R = 10% P.A.

26. **Ans. (c)**

27. **Ans. (wrong)** None of choices as no choice is orthogonal to given vector.

30. **Ans. (c)** Statement I:- As roots of $x^2 - 4x - \log_3 a = 0$ are real iff $D \geq 0 \Rightarrow 16 + 4\log_3 a \geq 0$

$4\log_3 a \geq -16 \Rightarrow \log_3 a \geq -4 \Rightarrow a \geq 3^{-4} = \frac{1}{81}$

Statement II:-

As $S = \alpha + \beta = \frac{4+\sqrt{5}}{5+\sqrt{2}}, \quad \alpha\beta = \frac{8+2\sqrt{5}}{5+\sqrt{2}}$

$$\text{H.M.} = \frac{2\alpha\beta}{\alpha+\beta} = \frac{\frac{2\left(8+2\sqrt{5}\right)}{5+\sqrt{2}}}{\frac{4+\sqrt{5}}{5+\sqrt{2}}} = \frac{4\left(4+\sqrt{5}\right)}{4+\sqrt{5}} = 4$$

$\Rightarrow$ Statement II is not true.

32. **Ans. (b)**

33. **Ans. (d)** As P(1, 2), Q(2, 1)

and E : $\frac{x^2}{9}+\frac{y^2}{4}-1=0$, C : $x^2 + y^2 - 9 = 0$

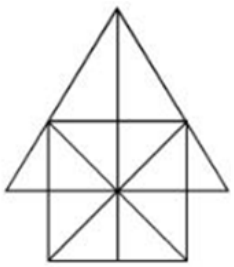
Now at P(1, 2) $\Rightarrow E : \frac{1}{9}+\frac{4}{4}-1=\frac{1}{9}+1-1>0$

$\Rightarrow$ P lies outside E.
Also C: $1^2 + 2^2 - 9 < 0 \Rightarrow$ P lies inside C.
$\Rightarrow$ P lies inside C but outside E.

34. **Ans. (b)** $y = -x + 6 \Rightarrow x + y = 6 \Rightarrow$ slope $= -1$
Also slope of (b) $-3x - 3y + 7 = 0$ is $= -1$
$\Rightarrow$ (b) satisfies

35. **Ans. (d)** C, D, E are true.

36. **Ans. (d)**



$8 \times 2 = 16$
(d) 28 triangles, 6 square

38. **Ans. (a)** Minimum no. of colour required is 3.

39. **Ans. (d)** All are connected to edges but option (d) is not connected.

40. **Ans. (d)** $e^{\log_{10}\tan 1^\circ + \log_{10}\tan 2^\circ ..... + \log_{10}\tan 89^\circ}$

$= e^{\log_{10}(\tan 1^\circ \tan 2^\circ ..... \tan 89^\circ)} = e^{\log_{10} 1} = e^\circ = 1$

as $\tan 1^\circ \tan 2^\circ ..... \tan 90^\circ = 1$

41. **Ans. (d)** $\vec{a} + \lambda\vec{b} = (2 - \gamma)i + (2 + 2\gamma)j + (3 + \gamma)k$
is perpendicular to $\vec{c}$
$\Rightarrow 3(2 - \gamma) + (2 + 2\gamma) = 0 \Rightarrow 8 - \gamma = 0 \Rightarrow \gamma = 8$

43. **Ans. (b)** $\left|\vec{a}-\vec{b}\right| < 1 \Rightarrow \left|\vec{a}-\vec{b}\right|^2 < 1$

$\Rightarrow \left|\vec{a}\right|^2 + \left|\vec{b}\right|^2 - 2\vec{a}.\vec{b} < 1$

$\left|\vec{a}\right|^2 + \left|\vec{b}\right|^2 - 2\left|\vec{a}\right|.\left|\vec{b}\right|\cos 2\theta < 1$

$1+1-2.1\cos 2\theta < 1$

$1 < 2\cos 2\theta \Rightarrow \cos 2\theta > \frac{1}{2}$

Only (b) choice satisfies as $\frac{5\pi}{6} < \theta < \pi \Rightarrow \frac{5\pi}{3} < 2\theta < 2\pi$

$\Rightarrow \cos 2\theta > \frac{1}{2}$

44. **Ans. (d)**

45. **Ans. (c)** A : Angle between lines $2x^2 + 3y^2 - 7xy = 0$

$$\tan\theta = \frac{2\sqrt{\left(\frac{7}{2}\right)^2 - 6}}{2+3} = \frac{2.\frac{5}{2}}{5} = 1 \Rightarrow \theta = \frac{\pi}{4}$$

B : Here $r_1 = \sqrt{\frac{1}{4}+\frac{1}{4}} = \sqrt{\frac{1}{2}}$, $r_2 = \sqrt{\frac{1}{4}+\frac{1}{4}} = \sqrt{\frac{1}{2}}$

$C_1 = \left(-\frac{1}{2}, -\frac{1}{2}\right), C_2 = \left(-\frac{1}{2}, \frac{1}{2}\right)$

$$d = \sqrt{\left(-\frac{1}{2}+\frac{1}{2}\right)^2 + \left(-\frac{1}{2}-\frac{1}{2}\right)^2} = 1$$

$$\Rightarrow \cos\theta = \frac{r_1^2 + r_2^2 - d^2}{2r_1r_2}$$

$$= \frac{\left(\sqrt{\frac{1}{2}}\right)^2 + \left(\sqrt{\frac{1}{2}}\right)^2 - 1}{2\sqrt{\frac{1}{2}}.\sqrt{\frac{1}{2}}} = \frac{1+1-1}{1} = 0 \Rightarrow \theta = \frac{\pi}{2}.$$

C : As centre is (1, 2) and passing through (4, 6)

$\Rightarrow r = \sqrt{(4-1)^2 + (6-2)^2} = 5$

$\Rightarrow$ Area $= \pi r^2 = \pi(5^2) = 25\pi$

D : $y^2 = 4x$, $x^2 = 32y$

$$y^2 = 4x \Rightarrow 2y\frac{dy}{dx} = 4 \Rightarrow \frac{dy}{dx} = \frac{2}{y}\Big|_{(16,8)} = \frac{2}{8} = \frac{1}{4} = m_1$$

$$x^2 = 32y \Rightarrow 32\frac{dy}{dx} = 2x \Rightarrow \frac{dy}{dx} = \frac{x}{16}\Big|_{(16,8)} = 1 = m_2$$

$$\Rightarrow \tan\theta = \left|\frac{m_1 - m_2}{1 + m_1m_2}\right| = \left|\frac{1-\frac{1}{4}}{1+1.\frac{1}{4}}\right| = \frac{3}{5} \Rightarrow \theta = \tan^{-1}\frac{3}{5}$$

46. **Ans. (a)** As $\alpha = a + a^2 + a^4$
$\beta = a^3 + a^5 + a^6$
$\Rightarrow \alpha + \beta = a + a^2 + a^3 + a^4 + a^5 + a^6$

As $a = \cos\frac{2\pi}{7} + i\sin\frac{2\pi}{7}$ is 7^{th} roots of unity

$\Rightarrow 1 + a + a^2 + a^3 + a^4 + a^5 + a^6 = 0$
$\Rightarrow a + a^2 + a^3 + a^4 + a^5 + a^6 = -1 = S$
and $\alpha\beta = (a + a^2 + a^4)(a^3 + a^5 + a^6)$
$= a^4 + a^6 + a^7 + a^5 + a^7 + a^8 + a^7 + a^9 + a^{10}$
As $a^7 = 1$ ($\because 7^{\text{th}}$ roots of unity)
$\Rightarrow \alpha\beta = a^4 + a^6 + 1 + a^5 + 1 + a + 1 + a^2 + a^3$
$= 1 + a + a^2 + a^3 + a^4 + a^5 + a^6 + 2$
$= 0 + 2 = 2 = P \Rightarrow$ QE. is $x^2 - Sx + P = 0$
$\Rightarrow x^2 + x + 2 = 0$

47. **Ans. (a)** **Concept:** The given data is,
The capacity of the RAM needed = 16K

Capacity of the chips available = 1K

Explanation: No. of address lines = 16K/1K=16
Hence we can use 4 x 16 decoder for this. But we were only given 2 x 4 decoders.
So 4 decoders are required in inner level as from one 2×4 decoder we have only 4 output lines whereas we need 16 output lines. Now to point to these 4 decoders, another 2x4 decoder is required in the outer level.
Hence no. of 2x4 decoders to realize the above implementation of RAM=1+4=5
Hence the correct answer is 5.

48. **Ans. (a)** A (4, 0), B(-1, -1), C(3, 5)

$\Rightarrow AB = \sqrt{(4+1)^2+(0+1)^2} = \sqrt{26}$

$BC = \sqrt{(-1-3)^2+(-1-5)^2} = \sqrt{52}$

$AC = \sqrt{(4-3)^2+(0-5)^2} = \sqrt{26}$

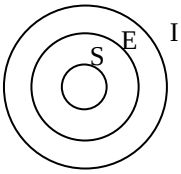
$\Rightarrow BC^2 = AB^2 + AC^2$

Also $AB = AC = \sqrt{26}$

$\Rightarrow$ triangle is isosceles and right angled.

49. **Ans. (b)** **RESULT**

50. **Ans. (b)** All students are innovative is correct



51. **Ans. (a)** **Statement I :** By using 1, 2, 1, 0, 2, 2 six digit nos. are = total nos. 0 at left must place

$= \frac{\lfloor 6}{\lfloor 2 \lfloor 3} - \frac{\lfloor 5}{\lfloor 2 \lfloor 3} = 60 - 10 = 50 \Rightarrow$ statement I is true.

Statement II : - Total four digit nos. out of 0, 1, …… 9 = total four digit nos.- 0 at left most place

$= {}^{10}P_4 - {}^{9}P_3 = \frac{\lfloor 10}{\lfloor 6} - \frac{\lfloor 9}{\lfloor 6}$

$= \frac{1}{\lfloor 6}[\lfloor 10 - \lfloor 9] = \frac{\lfloor 9}{\lfloor 6}[10-1] = 9 \times 8 \times 7 \times 9 = 4536.$

$\Rightarrow$ Statement II is true.
$\Rightarrow$ Both statement I, II are true.

52. **Ans. (c)** As $y_i = (i+1)x_i$ where $x_i = i$

$\Rightarrow y_i = (i+1)i = i^2 + i$

$\bar{y} = \frac{\Sigma y_i}{n} = \frac{\Sigma i^2}{n} + \frac{\Sigma i}{n}$

$= \frac{n(n+1)(2n+1)}{6.n} + \frac{n(n+1)}{2.n}$

$= \frac{(n+1)(2n+1)}{6} + \frac{n+1}{2}$

$= (n+1)\left[\frac{(2n+1)+3}{6}\right] = \frac{(n+1)(n+2)}{3}$

53. **Ans. (d)** As moment of couple $= (\vec{r}_1 - \vec{r}_2) \times \vec{F}_1$

$\Rightarrow \vec{r}_1 - \vec{r}_2 = (9,-1,2) - (3.-2,1) = (6,1,1)$

$\vec{F}_1 = 5i + k \Rightarrow (\vec{r}_1 - \vec{r}_2) \times \vec{F}_1 = \begin{vmatrix} i & j & k \\ 6 & 1 & 1 \\ 5 & 0 & 1 \end{vmatrix}$

$= i(1) - j(6-5) + k(-5) = i - j - 5k$

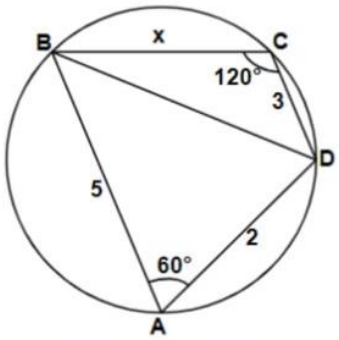
54. **Ans. (b)**

4,	10,	-,	82,	244,	730
↓	↓	↓	↓	↓	↓
3+1	3^2+1	3^3+1	3^4+1	3^5+1	3^6+1

Answer is 3^3+1
27 +1= 28

55. **Ans. (d)** Decimal value = (3*4096+15*256+5*16+3)
It can be written as:
$(2+1)\times 2^{12} + (8+4+2+2^0) \times 2^8 + (4+1) \times 2^4 + (2+1) \times 2^0$
$2^1 \times 2^{12} + 2^0 \times 2^{12} + (2^3+2^2+2^1+2^0) \times 2^8 + (2^2+2^0) \times 2^4 + (2^1+2^0) \times 2^0$
This can be written as:
$2^{13} + 2^{12} /+ 2^{11} + 2^{10} + 2^9 \times 2^8 + 2^6 + 2^4 + 2^1 + 2^0$
The binary representation will be
$(11111101010011)_2$

56. **Ans. (a)** The correction of is A 2



In ΔABD

$\cos 60° = \frac{2^2 + 5^2 - BD^2}{2 \times 2 \times 5} \Rightarrow \frac{1}{2} = \frac{29 - BD^2}{2 \times 2 \times 5}$

$\Rightarrow BD^2 = 19$

In ΔBCD

$\cos 120° = \frac{x^2 + 9 - 19}{2x \times 3} \Rightarrow \frac{-1}{2} = \frac{x^2 - 10}{6x}$

$\Rightarrow x^2 + 3x - 10 = 0 \Rightarrow (x+5)(x-2) = 0$
$\Rightarrow x = 2$ or -5 (not Possible)
$\therefore$ Length of the fourth side is = 2

57. **Ans. (d)** If f, g are diff. in (0, 1)
$\Rightarrow$ By Lagrange's theorem

$f'(c) = \frac{f(1) - f(0)}{1-0} = \frac{6-2}{1} = 4$

$g'(c) = \frac{g(1) - g(0)}{1-0} = \frac{2-0}{1} = 2$

$\Rightarrow f'(c) = 2g'(c)$

58. **Ans. (a)** Here cot A cot B cot C = K
As A.M. $\geq$ G.M.

$\frac{\cot A + \cot B + \cot C}{3} \geq (\cot A \cot B \cot C)^{\frac{1}{3}} = K^{\frac{1}{3}}$

As A + B + C = π ⇒ At $A = B = C = \frac{\pi}{3}$ can take max. value of cot A + cot B + cot C

$= \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} + \frac{1}{\sqrt{3}} = \sqrt{3}$

$\Rightarrow K^{\frac{1}{3}} \le \frac{\sqrt{3}}{3} = \frac{1}{\sqrt{3}} \Rightarrow K \le \left(\frac{1}{\sqrt{3}}\right)^3 = \frac{1}{3\sqrt{3}}$

60. **Ans. (c)** Let $\vec{a} = 2i + 3j + k$, $\vec{b} = 2i - j - k$

Here $\vec{a}.\vec{b} = 0$

Angle between $\vec{a}.\vec{b}$ is $\frac{\pi}{2}$.

So statement I is true

But statement II is not true.

61. **Ans. (d)** f(x) = tan²x is continuous at $x = \frac{\pi}{2}$

is not true as $f\left(\frac{\pi}{2}\right) = \infty$ is undefined.

But g(x) = x² is continuous everywhere so

continuous at $x = \frac{\pi}{2}$.

63. **Ans. (b, c)** Let circle be $x^2 + y^2 + 2gx + 2fy + c = 0$

Cut circle $(x - 1)^2 + y^2 = 16 \Rightarrow x^2 + y^2 - 2x - 15 = 0$

and $x^2 + y^2 = 1$ orthogonally ⇒

$2[g(-1) + f(0)] = c_1 + c_2 = c - 15$ …(1)

Also $2(g(0) + f(0)] = c_1 + c_2 = c - 1$ …(2)

Subtract 2(-g) = - 14 ⇒ g = 7

Put g = 7 in (1)

2(-7) = c – 15 ⇒ c = 1

As circle $x^2 + y^2 + 2gx + 2fy + c = 0$

Passes through (0, 1)

⇒ 1 + 2f + c = 0 ⇒ 1 + 2f + 1 = 0 ⇒ f = - 1

⇒ Radius $r = \sqrt{g^2 + f^2 - c} = \sqrt{7^2 + 1^2 - 1} = 7$

Centre (-g, - f)=(-7, 1)

64. **Ans. (c)** **STATEMENT 1:** is true as a result

STATEMENT 2: As $0 < x < 1 \Rightarrow x^3 < x < x^{1/7}$

$\int_0^1 \sqrt{(1+x)(1+x^3)}\,dx < \int_0^1 \sqrt{(1+x^{1/7})(1+x^{1/7})}\,dx$

$= \int_0^1 (1 + x^{1/7})\,dx = \left| x + \frac{7x^{\frac{8}{7}}}{8} \right|_0^1 = \frac{15}{8}$

65. **Ans. (a)** As $f(x) = \begin{cases} \frac{x}{|x|}, & x < 0 \\ -1, & x \ge 0 \end{cases}$

$= \begin{cases} \frac{x}{-x}, & x < 0 \\ -1, & x \ge 0 \end{cases} = \begin{cases} -1, & x < 0 \\ -1, & x \ge 0 \end{cases}$

= - 1 for every x ⇒ f is cont. for every x

66. **Ans. (a)** Let α be common root of

$x^2 + px + qr = 0$, $x^2 + qx + rp = 0$

$\Rightarrow \alpha^2 + p\alpha + qr = 0$, $\alpha^2 + q\alpha + rp = 0$

$\Rightarrow (p - q)\alpha + r(q - p) = 0 \Rightarrow \alpha = -r$

IIly if β is common root of

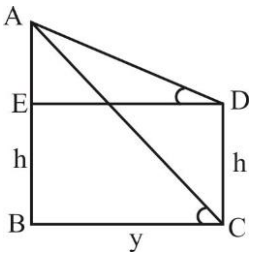
$x^2 + qx + rp = 0$, $x^2 + rx + pq = 0 \Rightarrow \beta = p$

And γ is common root of

$x^2 + qx + rp = 0$, $x^2 + rx + pq = 0 \Rightarrow \gamma = q$

⇒ their product αβγ = pqr

67. **Ans. (b)**

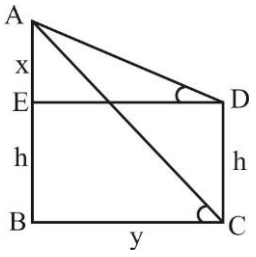


In ΔADE $\Rightarrow \frac{x}{y} = \tan p \Rightarrow y = x \cot p$

ΔABC $\Rightarrow \frac{h + x}{y} = \tan q \Rightarrow \frac{y}{h + x} = \cot q$

$\Rightarrow \frac{x \cot p}{h + x} = \cot q$

67. **Ans. (b)**



In ΔADE $\Rightarrow \frac{x}{y} = \tan p \Rightarrow y = x \cot p$

ΔABC $\Rightarrow \frac{h + x}{y} = \tan q \Rightarrow \frac{y}{h + x} = \cot q$

$\Rightarrow \frac{x \cot p}{h + x} = \cot q \Rightarrow$ x cot p = (h + x) cot q

x (cot p – cot q) = h cot q ⇒ $x = \frac{h \cot q}{\cot p - \cot q}$

68. **Ans. (a)** $\left|\vec{a} + \vec{b} + \vec{c}\right|^2$

$= \left|\vec{a}\right|^2 + \left|\vec{b}\right|^2 + \left|\vec{c}\right|^2 + 2\left(\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{a}.\vec{c}\right)$

$= \left|\vec{a}\right|^2 + \left|\vec{b}\right|^2 + \left|\vec{c}\right|^2 + 2\left(\left|\vec{a}\right|\left|\vec{b}\right|\cos 60° + \left|\vec{b}\right|\left|\vec{c}\right|60° + \left|\vec{a}\right|\left|\vec{c}\right|60°\right)$

$= 4^2 + 2^2 + 6^2 + 2\left(4.2.\frac{1}{2} + 2.6.\frac{1}{2} + 4.6.\frac{1}{2}\right)$

$= 16 + 4 + 36 + (8 + 12 + 24) = 100$

$\Rightarrow \left|\vec{a} + \vec{b} + \vec{c}\right|^2 = 100 \Rightarrow \left|\vec{a} + \vec{b} + \vec{c}\right| = 10$

69. **Ans. (a)** **results based**

70. **Ans. (c)**

$\sum_{m=1}^{6} \operatorname{cosec}\left(\theta + (m-1)\frac{\pi}{4}\right)\operatorname{cosec}\left(\theta + \frac{m\pi}{4}\right) = 4\sqrt{2}$

$$\sum_{m=1}^{6}\frac{\sin\left(\frac{\pi}{4}\right)}{\sin\left(\theta+(m-1)\frac{\pi}{4}\right)\sin\left(\theta+\frac{m\pi}{4}\right)}\times\frac{1}{\sin\frac{\pi}{4}}$$

$$=\sum_{m=1}^{6}\frac{\sin\left(\left(\theta+\frac{m\pi}{4}\right)-\left(\theta+(m-1)\frac{\pi}{4}\right)\right)}{\sin\left(\theta+(m-1)\frac{\pi}{4}\right)\sin\left(\theta+\frac{m\pi}{4}\right)}.\frac{1}{\sin\frac{\pi}{4}}$$

$$=\sum_{m=1}^{6}\frac{\sin\left(\theta+\frac{m\pi}{4}\right)\cos\left(\theta+(m-1)\frac{\pi}{4}\right)-\cos\left(\theta+\frac{m\pi}{4}\right)\sin\left(\theta+(m-1)\frac{\pi}{4}\right)}{\sin\left(\theta+(m-1)\frac{\pi}{4}\right)\sin\left(\theta+\frac{m\pi}{4}\right)}\times\frac{1}{\sin\frac{\pi}{4}}$$

$$\sum_{m=1}^{6}\left[\cot\left(\theta+(m-1)\frac{\pi}{4}\right)-\cot\left(\theta+\frac{m\pi}{4}\right)\right]\times\frac{1}{\sin\frac{\pi}{4}}$$

$$=\left[\left(\cot\theta-\cot\left(\theta+\frac{\pi}{4}\right)\right)+\cot\left(\theta+\frac{\pi}{4}\right)-\cot\left(\theta+\frac{2\pi}{4}\right)\right.$$

$$+\cot\left(\theta+\frac{2\pi}{4}\right)-\cot\left(\theta+\frac{3\pi}{4}\right)+\cot\left(\theta+\frac{3\pi}{4}\right)-\cot\left(\theta+\frac{4\pi}{4}\right)$$

$$+\cot\left(\theta+\frac{4\pi}{4}\right)-\cot\left(\theta+\frac{5\pi}{4}\right)+\cot\left(\theta+\frac{5\pi}{4}\right)$$

$$\left.-\cot\left(\theta+\frac{6\pi}{4}\right)\right]\times\frac{1}{\sin\frac{\pi}{4}}$$

$$=\left[\cot\theta-\cot\left(\theta+\frac{6\pi}{4}\right)\right]\times\frac{1}{\sin\frac{\pi}{4}}$$

$$=\left[\cot\theta-\cot\left(\frac{3\pi}{2}+\theta\right)\right]\times\sqrt{2}$$

$$=(\cot\theta+\tan\theta)\sqrt{2}=4\sqrt{2}\ \Rightarrow\cot\theta+\tan\theta=4$$

From choices $\theta=\frac{\pi}{12}\Rightarrow\cot\frac{\pi}{12}=2+\sqrt{3}$ satisfies

and $\tan\frac{\pi}{12}=2-\sqrt{3}\Rightarrow\cot\frac{\pi}{12}+\tan\frac{\pi}{12}=4$

71. **Ans. (d)** A : ${}^{8}C_3-{}^{5}C_3-{}^{3}C_3=8\times7-10-1=45$
B : ${}^{8}C_2-8=20$
C : ${}^{100}C_2-100=45\times99-100$
D : ${}^{n}C_2-n=35\Rightarrow\frac{n(n-3)}{2}=35$
$n(n-3)=70\Rightarrow n=10$

72. **Ans. (d)** A : $\lim_{x\to0}\left(\frac{\sin x}{x}\right)^{\frac{\sin x}{x-\sin x}}=e^{\lim_{x\to0}\frac{\sin x}{x-\sin x}\left(\frac{\sin x}{x}-1\right)}$

[Using $\lim_{x\to a}[f(x)]^{g(x)}=e^{\lim_{x\to a}g(x)[f(x)-1]}$

as $f(x)=\frac{\sin x}{x}\to1$

and $g(x)=\frac{\sin x}{x-\sin x}=\frac{\frac{\sin x}{x}}{1-\frac{\sin x}{x}}\to\infty$ [as $x\to0$]

$$=e^{\lim_{x\to0}-\frac{\sin x}{x}}=e^{-1}$$

B: $\lim_{x\to0}\int_0^x\frac{\sin t^2dt}{x^2}=\lim_{x\to0}\frac{\int_0^x\sin t^2dt}{x^2}\left[\frac{0}{0}\right]$ form

$=\lim_{x\to0}\frac{\sin x^2}{2x}=\lim_{x\to0}\frac{\sin x^2}{2x^2}.x=0$ by LEIBNITZ RULE

C: $\lim_{x\to0}\left(e^{2x}+x\right)^{\frac{1}{x}}=\lim_{x\to0}\left(1+\frac{2x}{\underline{|1}}+.....+x\right)^{\frac{1}{x}}$

$=\lim_{x\to0}(1+3x)^{\frac{1}{x}}=e^3$

D: $L=\lim_{x\to a}\frac{\log(x-a)}{\log\left(e^x-e^a\right)}\left[\frac{\infty}{\infty}\right]$ form

By L'Hospital Rule

$$=\lim_{x\to a}\frac{1/(x-a)}{e^x/\left(e^x-e^a\right)}$$

$$=\lim_{x\to a}\frac{e^x-e^a}{(x-a)e^x}\qquad\left[\frac{0}{0}\right]\text{ form}$$

$$=\lim_{x\to a}\frac{e^x}{(x-a)e^x+e^x}=\lim_{x\to a}\frac{1}{(x-a)+1}=1.$$

73. **Ans. (d)** 8 : 81 : : 64 : _____
$(2)^3=8$ A - IV
$(3)^4=81$ B - III
$(4)^3=64$ C - II
$(5)^4=625$ D - I

74. **Ans. (a)** A : If a cos A = b cos B
Take a = k sin A, b = k sin B
$\Rightarrow$ k sin A cos A = k sin B cos B
$\Rightarrow$ sin 2A= sin 2B $\Rightarrow$ sin 2A – sin 2B = 0
$\Rightarrow 2\cos\frac{2A+2B}{2}\sin\frac{2A-2B}{2}=0$
$\Rightarrow$ 2 cos (A + B) sin (A – B) = 0
$\Rightarrow$ either cos (A + B) = 0 or sin (A – B) = 0
$\Rightarrow A+B=\frac{\pi}{2}$ or A – B = 0
$\Rightarrow C=\frac{\pi}{2}$ or A = B $\Rightarrow$ either right angled or isosceles.
B :- cos A cos B + sin A sin B sin C = 1
If sin C = 1 $\Rightarrow C=\frac{\pi}{2}$
Then cos A cos B + sin A sin B = 1
cos (A – B) = 1 $\Rightarrow$ A – B = 0 $\Rightarrow$ A = B
$\Rightarrow$ triangle is isosceles or right angled triangle
C: $r_1=\frac{\Delta}{s-a},r_2=\frac{\Delta}{s-b},r_3=\frac{\Delta}{s-c}$
If r_1, r_2, r_3 are in H.P. $\Rightarrow$ a, b, c are in A.P.

75. **Ans. (a)** As $\vec{A}.\vec{B}=\vec{0}$ and $\vec{A}\times\vec{B}=\vec{0}$
$\Rightarrow|\vec{A}||\vec{B}|\cos\theta=0$ and $|\vec{A}||\vec{B}|\sin\theta n=0$
Both possible iff either $|\vec{A}|=0$ or
$|\vec{B}|=0\Rightarrow$ either $\vec{A}$ or $\vec{B}$ is a null vector $\Rightarrow$
Assertion A is true.
Now reason R is also true as null vector is a vector with zero magnitude ____

(a) choice satisfies as both true and R is correct explanation of A.

76. **Ans. (b)** As B, C, D are true

77. **Ans. (a)** $A: |\vec{A}+\vec{B}| = |\vec{A}-\vec{B}|$

$|\vec{A}|^2 + |\vec{B}|^2 + 2\vec{A}.\vec{B} = |\vec{A}|^2 + |\vec{B}|^2 - 2\vec{A}.\vec{B}$

$\Rightarrow 4\vec{A}.\vec{B} = 0 \Rightarrow \vec{A}.\vec{B} = 0$

$\Rightarrow \vec{A}$ is perpendicular to $\vec{B} \Rightarrow$ A $\leftrightarrow$ III

B : $|\vec{A}\times\vec{B}| = \vec{A}.\vec{B}$

A B sin θ = AB cos θ $\Rightarrow$ tan θ = 1 $\Rightarrow$ θ = 45°

$\Rightarrow$ B $\leftrightarrow$ I

C : $|\vec{A}.\vec{B}| = B\cos\theta = \frac{AB}{2} \Rightarrow \cos\theta = \frac{1}{2}$

$\Rightarrow \theta = \frac{\pi}{3} = 60° \Rightarrow$ C : IV

D: $|\vec{A}\times\vec{B}| = AB\sin\theta = \frac{AB}{2} \Rightarrow \sin\theta = \frac{1}{2} \Rightarrow \theta = 30°$

$\Rightarrow$ D : II

78. **Ans. (b)** $\begin{vmatrix} x & x^2 & 1+x^3 \\ y & y^2 & 1+y^3 \\ z & z^2 & 1+z^3 \end{vmatrix} = 0$

$\Rightarrow \begin{vmatrix} x & x^2 & 1 \\ y & y^2 & 1 \\ z & z^2 & 1 \end{vmatrix} + \begin{vmatrix} x & x^2 & x^3 \\ y & y^2 & y^3 \\ z & z^2 & z^3 \end{vmatrix} = 0$

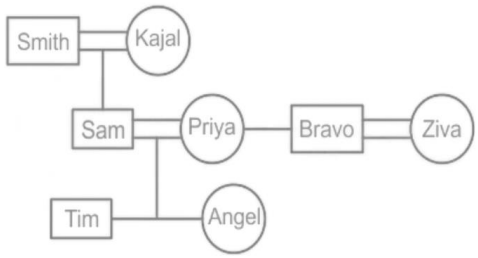
$\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} + xyz \begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = 0$

$\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} (1+xyz) = 0$

$\Rightarrow$ (x – y) y – z) (z – x) (1 + xyz) = 0

As x + y + z $\Rightarrow$ 1 + xyz = 0 $\Rightarrow$ xyz = - 1

79. **Ans. (b)**



From this diagram, we can see that Bravo is the husband of Ziva.
Hence, Option (b) is correct.

80. **Ans. (b)**

2	5	10
17	?	37
50	65	82

2,	5,	10,	17	_

1^2+1	2^2+1	3^2+1	4^2+1	5^2+1

37,	50,	65,	81
6^2+1	7^2+1	8^2+1	9^2+1

$\therefore 5^2 + 1 = 26$

82. **Ans. (b)** Tangent to $x^2 - y^2 = 3$
at (x_1y_1) is $xy_1 - yy_1 - 3 = 0$
as parallel to 2x + y + 8 = 0
$\Rightarrow$(2, - 1), (-2, 1) gives same slope.

83. **Ans. (b)**

Here $\bar{x} = \frac{a+(a+d)+(a+2d)+.....+(a+2nd)}{2n+1}$

$= \frac{(2n+1)a + d(1+2+.....+2n)}{2n+1}$

$= \frac{(2n+1)a + d\frac{2n(2n+1)}{2}}{2n+1}$ = a + nd

$\Rightarrow$ Mean deviation about mean $= \frac{1}{2n+1}\sum_{i=1}^{2n+1}|x_i - \bar{x}|$

$= \frac{1}{2n+1}\left[|-nd|+|-(n-1)d|\right] + ...+d+2d+.....+nd|$

$= \frac{1}{2n+1}2\left[d(1+2+.....+n)\right] = \frac{n(n+1)d}{2n+1}$

84. **Ans. (c)** $\int_{-3}^{3}(x^3+5)dx = \int_{-3}^{3}x^3dx + \int_{-3}^{3}5dx$

= 0 + 5(3 + 3) = 30
So assertion A is true.
Reason R : $f(x) = x^3 + 5$ is an odd function , not true.

85. **Ans. (a)** **Assertion A :** In parallelogram there are 9 Horizontal lines , 9 – vertical lines
No. of parallelogram= $^9C_2\ ^9C_2$

$= \frac{\lfloor 9}{\lfloor 2 \rfloor 7} \cdot \frac{\lfloor 9}{\lfloor 2 \rfloor 7} = 36\times 36 = 1296$

Reason is also true $\Rightarrow$ (a) choice true.

86. **Ans. (c)** Take m = 1
So there are four papers with maximum of 1 mark each and total 2m = 2 marks so possibilities are

$(1,1,0,0) \rightarrow \frac{\lfloor 4}{\lfloor 2 \rfloor 2} = 6$ ways

Total ways = 6 ways $\Rightarrow$ Only (c) choice is satisfied.

87. **Ans. (a)** From choices
(a) choice gives 6, 3

$\Rightarrow A = \frac{9}{2}, G = \sqrt{18}, H = \frac{2\times 6\times 3}{9} = 4$

Satisfies $2A + G^2 = 27$

88. **Ans. (c)** Given binary number is
00111110011011010000000000000000
Here, sign bit is 0. So, number is positive.

0	01111100	11011010000000000000000

Exponent bits = E = 01111100 = 124 (in decimal)
Mantissa bits M = 11011010000000000000000

In IEEE-754 format, 32-bit (single precision)
$(-1)^5 \times 1.M \times 2^{E-127}$
$= (-1)^0 \times 1.1101101 \times 2^{124-127}$
$= 1.1101101 \times 2^{-3}$
$=(1+2^{-1}+2^{-2}+2^{-4}+2^{-5}+2^{-7}) \times 2^{-3}$
$= 0.231 = 2.31 \times 10^{-1} = 2.27 \times 10^{-1}$

89. **Ans. (c)** As A_1, A_2 are two AM's between a, b
$\Rightarrow$ a, A_1, A_2, b in A.P. $\Rightarrow A_1 + A_2 = a + b$
As G_1, G_2 are two AM's between a, b
Also a, G_1, G_2, b in G.P. $\Rightarrow G_1G_2 = ab$
So $\dfrac{A_1 + A_2}{G_1G_2} = \dfrac{a+b}{ab}$

90. **Ans. (c)** As curves $ay + x^2 = 7$ and $x^3 = y$ cut orthogonally at (1, 1)
So $a\dfrac{dy}{dx} + 2x = 0 \Rightarrow \dfrac{dy}{dx} = -\dfrac{2x}{a}\Big|_{(1,1)} = \dfrac{-2}{a} = m_1$

$3x^2 = \dfrac{dy}{dx} \Rightarrow \dfrac{dy}{dx}\Big|_{(1,1)} = 3 = m_2$

$\Rightarrow m_1m_2 = -1 \Rightarrow -\dfrac{2}{a}.3 = -1 \Rightarrow a = -6$

91. **Ans. (b)** As m passages are n floors so sample space has nth possibitlies and no two alight at same floor is $= {}^nP_m$

$\Rightarrow$ Required probability $= \dfrac{{}^nP_m}{n^m}$

So assertion A is wrong.
Also Reason R is true by letting n=2,m=1,p=1/3
Bur R is not correct explanation of A

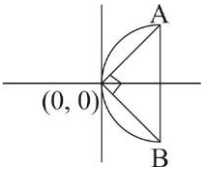
92. **Ans. (d)** $f(x) : x^2 + 1$
$\Rightarrow f'(x) = 2x = 0 \Rightarrow x = 0$
$f'' = 2 > 0 \Rightarrow x = 0$ is a point of minima. $\Rightarrow$
minimum value is $f(0) = 0^2 + 1 = 1$

93. **Ans. ( )** 1 refresh operation takes 50ns.
Total number of rows = 2^{14}
Total time to refresh all Rows $= 2^{14} \times 50$ ns = 819200 ns = 0.819200 ms
The Refresh Period is 2ms.
% Time in refresh = (Time to Refresh all Rows / Refresh period)* 100% Time spent in Read / Write = 100-40.96=59.04%
Time spent in Read / Write = 100-40.96-59.04%

94. **Ans. (b)** Assertion A is true.
As line joining centres is perpendicular to common chord.
Reason R is also true.
But R is not correct explanations of A.

95. **Ans. (a)** Here $\sin\beta = \sqrt{\sin\alpha\cos\alpha}$
So $\cos2\beta = 1 - 2\sin^2\beta = 1 - 2\sin\alpha\cos\alpha$
$= 1 - \sin2\alpha = 1 - \cos\left(\dfrac{\pi}{2} - 2\alpha\right) = 2\sin^2\left(\dfrac{\pi}{4} - \alpha\right)$

96. **Ans. (c)**



Normal to parabola with slope m is $y = mx - 2am - am^3$ at $A(am^2, 2am)$ and corresponding point B is $(am^2 - 2am)$ .As OAB is right angle triangle $\Rightarrow$ slope of OA = $- 2am/am^2 = -2/m$
Slope of OB = $2/m$
So $\left(\dfrac{2}{m}\right)\left(\dfrac{-2}{m}\right) = -1 \Rightarrow m = \pm 2$

97. **Ans. (a)** Take $\dfrac{1}{2}\left|\vec{n}_1 + \vec{n}_2\right| \Rightarrow \left(\dfrac{1}{2}\left|\vec{n}_1 + \vec{n}_2\right|\right)^2$

$= \dfrac{1}{4}\left[\left|\vec{n}_1\right|^2 + \left|\vec{n}_2\right|^2 + 2\left|\vec{n}_1\right|\left|\vec{n}_2\right|\cos\theta\right]$

$= \dfrac{1}{4}\left[1+1+2.1.1\cos\theta\right] = \dfrac{1}{4}\left[2+2\cos\theta\right]$

$= \dfrac{1}{4}2\left(1+\cos\theta\right) = \dfrac{1}{2}\left(2\cos^2\dfrac{\theta}{2}\right) = \left(\dfrac{1}{2}\left|\vec{n}_1 + \vec{n}_2\right|\right)^2$

$\Rightarrow \cos\dfrac{\theta}{2} = \dfrac{1}{2}\left|\vec{n}_1 + \vec{n}_2\right|$

99. **Ans. (b)** (Result)

100. **Ans. (d)** (a) choice gives $f(x) = \cos|x| + |x|$

$f'(0) = \lim\limits_{x\to0}\dfrac{\cos|x| + |x| - (\cos0 + 0)}{x - 0}$

$= \lim\limits_{x\to0}\dfrac{\cos|x| + |x| - 1}{x}$

LHD $\lim\limits_{x\to0}\dfrac{\cos(-x) + (-x) - 1}{x}$

$= \lim\limits_{x\to0^-}\dfrac{\cos x - x - 1}{x} \to \dfrac{0}{0}\ form$

$= \lim\limits_{x\to0^-}\dfrac{(-\sin x) - 1}{1} = -1$

RHD $= \lim\limits_{x\to0^+}\dfrac{\cos x + x - 1}{x} = \lim\limits_{x\to0^+}\dfrac{-\sin x + 1}{1} = 1$

$\Rightarrow$ LHD $\neq$ RHD $\Rightarrow$ Not diff. at x = 0
IIly (b) choice not diff.
Now (c) choice $f(x) = \sin|x| + |x|$

$f'(0) = \lim\limits_{x\to0}\dfrac{\sin|x| + |x| - (\sin0 + 0)}{x}$

$f'(0^-) = \lim\limits_{x\to0^-}\dfrac{\sin(-x) - x}{x} = \lim\limits_{x\to0^-}\dfrac{-\sin x}{x} - 1 = -1 - 1 = -2$

$f'(0^+) = \lim\limits_{x\to0^+}\dfrac{(\sin x + x) - (\sin0 + 0)}{x} = \lim\limits_{x\to0^+}\dfrac{\sin x}{x} + 1 = 2$

$\Rightarrow f(x) = \sin|x| + |x|$ not diff. at x = 0
Now (d) choice at $f(x) = \sin|x| - |x|$

LHD $\lim\limits_{x\to0^-}\dfrac{(\sin|x| - |x|) - (\sin0 - 0)}{x}$

$= \lim\limits_{x\to0^-}\dfrac{\sin(-x) + x}{x} = -1 + 1 = 0$

RHD $\lim\limits_{x\to0^+}\dfrac{(\sin|x| - |x|) - (\sin0 - 0)}{x}$

$= \lim_{x \to 0^+} \frac{\sin x - x}{x} = 1 - 1 = 0$

$\Rightarrow$ LHD = RHD $\Rightarrow$ f(x) = sin |x| - |x| is diff. at x = 0