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1. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 hrs, the true time is;

(a) 3 hrs $59\frac{7}{12}$min (b) 4 hrs

(c) 4 hrs $2\frac{3}{11}$min (d) 3 hrs $58\frac{7}{11}$min

2. In how many different ways can the letters of the word 'LEADER' be arranged in such a way that the vowels always come together ?

(a) 72 (b) 144
(c) 48 (d) 720

3. A rectangular park 60 m long and 40m wide has two concrete crossroads running in the middle of the part and rest of the park has been used as a lawn. If the area of the lawn is 2109 sq.m. then what is the width of the road;

(a) 5.82 m (b) 2.91 m

(c) 3 m (d) 1.91 m

4. Insert the missing number in the series 16, 33, 65, 131, 261, ...

(a) 521 (b) 721

(c) 523 (d) 613

5. Find the wrong number in the series 7, 8, 18, 228, 1165, 6996;

(a) 228 (b) 8

(c) 1165 (d) 57

6. If D=the day (1 – 366) in year Y, then the day of the week for D can be calculated using the following formula $d = \left(D + Y + \frac{Y-1}{4} - \frac{Y-1}{100} + \frac{Y-1}{400}\right)$ mod 7 where d=1 would mean Sunday, 2=Monday and so on. Which of t he following days can the first day of a century NOT be ?

(a) Thursday (b) Monday

(c) Saturday (d) Friday

7. If A and B run a race, then A wins by 60 seconds. If B and C run the same race, then B wins by 30 seconds. Assuming that C maintains a uniform speed to find the time taken by C to finish the race, which of the following statement are needed ?

I. A and C run the same race and A wins by 375 metres.

II. The length of the race is 1 km.

(a) Either I or II is sufficient to answer the question
(b) Both I and II are needed to answer the question
(c) Both are no sufficient to answer the question
(d) Not enough information to answer the question

8. Consider the following statements- There are six village A, B, C, D, E and F.

1. F is 1 km to the west of D.
2. B is 1 km to the east of E
3. A is 2 km to the north of E
4. C is 1 km to the east of B
5. D is 1 km to the south of A

(a) A, D, E (b) A, C, B
(c) E, B, D (d) C, B, F

9. Find the odd man out in the following series ? 844, 211, 120, 752, 541, 303

(a) 303 (b) 211
(c) 844 (d) 120

10. There are five hobby clubs in a college viz photography, yachting, chess, electronics and gardening. The gardening group meets every second day, the electronics groups meets every third day, the cheese group meets every fourth day, the yachting group meets every fifth day and the photography group meets every sixth day. How many time do all the five groups meet on the same day within 360 days ?

(a) 18 (b) 12
(c) 6 (d) 30

11. Four political parties W, X, Y and Z decided to set up a joint candidate for the coming elections. The formula agreed by them was the acceptance of a candidate of the most of the parties. Four aspiring candidates A, B, C and D approached the parties for thicket.

(a) A was acceptable to W but not Z.
(b) B was acceptable to Y nut no X.
© C was acceptable to W and Y.
(d) D was acceptable to W and X.

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

12. Raman walks 100 m from his house towards North. From there he goes 100 m towards West. Here is the house of Shyam. From there they both go to the market which is in the perfect South-West direction from Shyam's house. If the market is exactly to the West of Raman's house, then the how far is the market from Raman's house ?

(a) 100 m (b) 200 m
(c) 250 m (d) 150 m

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13. How many three digit numbers can generated from 1, 2, 3, 4, 5, 6, 7, 8, 9 such that the digits are in ascending order.
(a) 81 (b) 80
(c) 84 (d) 83

14. Two cubes of sides 6 m each are kept side by side to from a rectangular parallelepiped. What is the surface area of the rectangular parrallelopiped ?
(a) 180 (b) 360
(c) 432 (d) 288

15. The sum of the length of all the edges of a rectangular box is 12 cm. If the total surface area of the box is 5 sq. com. then length of its diagonal is;
(a) 2 cm
(b) 13 cm
(c) Not enough information to find the diagonal
(d) 3 cm

16. Three persons A, B and C wore shirts of black, blue and orange colours (not necessarily in that order) and pants of green, yellow and orange colours (no necessarily in that order). No persons wear shirts and pants of the same colour. Further it is given that-
(a) A did not wear shirt of black colour.
(b) B did not wear shirt of blue colour.
(c) C did not wear shirt of orange colour.
(d) A did not wear pant of green colour.
(e) B wore a pant of orange colour.
What were the colours of the pants and shirts wore by C respectively ?
(a) yellow and blue (b) orange and black
© yellow and black (d) green and blue

17. If South-East becomes North, North-East becomes West and son on, what will West become ?
(a) South-East (b) North-East
(c) South-West (d) North-West

18. In the following number line, how many times do the two consecutive numbers have a difference of 2 ? 7 5 9 5 2 3 5 9 4 8 5 9 5 4 5 9 3 5 5 9 5 3 5 9 4 5 2 5 3 6 5 9
(a) 7 (b) 9
(c) 8 (d) 5

19. The letter L, M, N, O, P, Q, R, S and T in their order are substituted by none integers 1 and 9 but not in that order. 4 is assigned to P. The difference between P and T is 5. The difference between N and T is 3. What is the integer assigned to N ?
(a) 5 (b) 7
(c) 6 (d) 4

20. In five flats, one above the other, live five professionals. The professor has to go up the met his IAS officers friend. The doctor is equally friendly to all, and has to go up as frequently as go down. The engineer hat to go up to meet his Lawyer fried above whose flat lives the professors friends. From the ground floor to the top floor, in what order do the five professionals live ?
(a) Professors, Engineer, Doctor, IAS officer, Lawyer.
(b) Engineer, Professors, Doctor, IAS officer, Lawyer
(c) Professors, Engineer, Doctor, Lawyer, IAS officers
(d) IAS officer, Engineer, Doctor, Professors, Lawyer

21. If 245 means 'Art and Talent' in a certain code language. 316 means 'Callons to Generous, 147 means 'Callous and Polite' then what is the code used for 'to' ?
(a) 3 or 6 (b) only 3
(c) only 6 (d) only 1

22. In a 100 m race, Bipin, Chandan, Danny and Feroz won the first four prizes, not necessarily in the same order. Each of there four sprinters hails from a different city among Delhi, Mumbai, Kokata and Chennai. Given the following conditions, who got the first prize ?
(a) Bipin is not from Kolkata and didn't get the first prize. The person from Chennai is the winner. Danny is from Mumbai.
(b) Feroz is either from Delhi or from Chennai.
(a) Chandan (b) Danny
(c) Can't determined (d) Feroz

23. If log 2=0.3010 and log 3=0.4771, then value of $\log_5 512$ is;
(a) 3.876 (b) 2.870
(c) 3.912 (d) 2.867

24. In a class of 45 students a boys is ranked 20^{th}. When two boys joined his rank dropped by one. What is this new rank from the end ?
(a) 26^{th} (b) 25^{th}
(c) 28^{th} (d) 27^{th}

25. The least perfect square which is divisible by 21.36 and 66 is;
(a) 214344 (b) 213444

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(c) 221444 (d) 214431

26. The sum of the series 1.2.3 + 2.3.4 + 3.4.5 + ... +18.19.20 is;
(a) 45450 (b) 24560
(c) 35910 (d) 44820

27. In a triangle, three angles are in Arithmetic Progression and ratios of smallest to largest angle is 1 : 5. What is the smallest angle ?
(a) $\frac{\pi}{10}$ (b) $\frac{\pi}{8}$
(c) $\frac{\pi}{6}$ (d) $\frac{\pi}{9}$

28. 2's complement of 010101.0101 is;
(a) 101010.1010 (b) 101011.1010
(c) 101011.0010 (d) 101010.1011

29. A logic circuit has three inputs bits x_0, x_1 and x_2, where x_0 is the least significant bit and x_2 is the most significant bit. The output from the circuit is 1 when its inputs is any of the 3-bit numbers, 1, 4, 5 or 6, otherwise the output is 0. Which of the following expression represents the output from this circuit ? (x_2 is complement of x_2)
(a) $x_2x_0+x_2x_1$ (b) $x_2x_1+x_1x_0$
(c) $x_2x_0+x_1x_0$ (d) $x_1x_0+x_2x_0$

30. Let be a 4×4 matrix. Suppose that a matrix B is obtained from A by using following row operations:
$R1 \leftrightarrow R2$
$R3 \leftrightarrow 4 \times R3$
$R4 \leftrightarrow R2$
$R2 \leftrightarrow R2 + 3 \times R3$
If |A|=20, then what is |B| ?
(a) 5 (b) –80
(c) 80 (d) –5

31. Two vectors 'a' and 'b' are perpendicular to each other such that length of 'a' is 8 and length of 'b' is 3. What is |a – 2b| ?
(a) 2 (b) 10
(c) 12 (d) 6

32. Express vector 'n' in terms of vectors a, b, and c show in the **figure**;
(a) –a + b + c (b) a – b – c
(c) –a –b –c (d) a + b + c

33. Logic X-OR operations of Hexadecimal umber (4AC0) and (B53F) is;
(a) FFFF (b) AACB
(c) ABCD (d) 0000

34. Find the sum of the series 1.1! + 2.2! + 3.3! +....+10.10! is;
(a) 39916800 (b) 39916801
(c) 29999999 (d) 39916799

35. A circle $x^2 + y^2 - x - 3y - \frac{25}{2} = 0$ has a chord x- y-1 =0 which forms the diameter of another circle. What is the equation representing this second circle ?
(a) $x^2 + y^2 - x - \frac{21}{2} = 0$
(b) $x^2 + y^2 - y - \frac{21}{2} = 0$
(c) $x^2 + y^2 - 3y - 3y - \frac{21}{2} = 0$
(d) $x^2 + y^2 - 3y - y - \frac{21}{2} = 0$

36. The equation of the locus of a point, which moves so that the sum of its distances from two given points (ae, 0) and (–ae, 0) is equal to 2a is;
(a) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ where $b^2 = a^2(1-e^2)$
(b) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ where $b^2 = a^2(1-e^2)$
(c) $(bx)^2 + (ay^2) =$ where $b^2 = a^2(1-e^2)$
(d) $(ax)^2 + (by^2) =$ where $b^2 = a^2(1-e^2)$

37. All values of α for which the point (α, α) lies inside the triangle formed by the lines 2x+3y-1=0, x+2y-3=0 and 5x-6y-1=0 are
(a) $\alpha \in \left(\frac{-3}{2}, \frac{3}{4}\right) \cup \left(\frac{1}{2}, 1\right)$
(b) $\alpha \in \left(\frac{-3}{2}, -1\right) \cup \left(\frac{1}{2}, 1\right)$
(c) $\alpha \in \left(\frac{-5}{2}, -1\right) \cup \left(\frac{1}{2}, 1\right)$
(d) $\alpha \in \left(-1\frac{-3}{4}, -1\right) \cup \left(\frac{1}{2}, 1\right)$

38. Which is the equation of a line whose slope is undefined ?
(a) x= -5 (b) y=7
(c) x + y=0 (d) x=y

39. $y=e^{-3x}$ is solution of the differential equation;
(a) $\frac{dy}{dx} + y^3 = 0$ (b) $3\frac{dy}{dx} + y = 0$

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(c) $\frac{dy}{dx}+3y^2=0$ (d) $\frac{dy}{dx}+3y=0$

40. The area of the region bounded by the curve $y^2=4x$, y-axis and the line y=3 is;
(a) 28/3 sq. units (b) 9/4 sq. units
(c) 9/16 sq. units (d) ¾ sq. units.

41. Let c_1 and c_2 be constants. The general solution of the differential equation $\frac{d^2y}{dx^2}=y=0$ is
(a) $y=c_1e^x$
(b) $y=c_1e^x+c_2e^{-x}$
(c) $y=c_1e^{x^2}+c_2e^{-x^2}y=c_1e^x+$
(d) $y=c_2e^{-x}$

42. Let the set S contains all strings w of 0s and 1s which have the following property, w contains an equal number of occurrences of 01 and 10. Which of the following words DOES NOT be long to S ?
(a) 101010 (b) 1010101
(c) 0101010 (d) All of these

43. Let N_2^+ denote the natural numbers greater than or equal to 2. Let be relation with n, mRn it god(m, n)>1. The binary relation R on N_2 is;
(a) Reflexive, Symmetric, Transitive
(b) Reflexive, Not Symmetric, Transitive
(c) Reflexive, Not Symmetric, Not Transitive
(d) Reflexive, Symmetric, Not Transitive

44. If two sets A and B have 500 elements in common, then the number of common element in the sets A×B and B×A is;
(a) 500 (b) 500^2
(c) 2^{500} (d) 1000

45. What is the number of points of intersection between the graphs given by the function $f(x)=x^3+2$ and $g(x)=x^2$, where $x\in R$?
(a) 3 (b) 2
(c) 1 (d) 0

46. A ray of light is sent along the line x-2y-3=0. On reaching the line 3x-2y-5=0 the ray is reflected from it. Find the equation of the line containing the reflected ray;
(a) 29x – 2y – 13=0 (b) 2x – 29y – 31=0
(c) 29x – 2y – 31=0 (d) 2x – 29y – 13=0

47. Let f(x)=4x(1-x) be defined for all $x\in R$. Then, the number of real numbers which satisfy the equation f(x)=x is;
(a) 1 (b) 0
(c) 3 (d) 2

48. The correlation coefficient between X and Y where $Y=X^3$ and X follows normal distribution with mean 0 and variance 1 is;
(a) $\frac{1}{\sqrt{15}}$ (b) 0
(c) $\frac{3}{\sqrt{15}}$ (d) $\frac{2}{\sqrt{15}}$

49. There are 13 players and the deck of cards are distributed equally amongst all the players at random. what is the probability of the player getting all the queens ?
(a) $\frac{1}{3^4\times4\times47}$ (b) $\frac{1}{3\times4^3\times47}$
(c) $\frac{1}{3^3\times4^3\times47}$ (d) $\frac{1}{3^3\times4^4\times47}$

50. The coefficient variation for the data X=[16 98 96 49 81 15 43 92 80 96] is;
(a) 49.63 (b) 33.05
(c) 99.93 (d) 66.6

51. Which of the following is not a liner mapping given that $f:R^2\to R^2$?
(a) $(x_1, x_2)\to(x_1+x_2, x_2)$
(b) $(x_1, x_2)\to(x_2+x_1)$
(c) $(x_1, x_2)\to(10, 0)$
(d) $(x_1, x_2)\to(x_1+1, x_2)$

52. The function is twice differentiable and the graph of 'f' has no points of inflection. If f(6)=3, $f'(6)=-\frac{1}{2}$ and $f''(6)=-2$ which of the following could be the value of f(7) ?
(a) 2.5 (b) 2
(c) 3 (d) 2.9

53. A spherical balloon is being inflated at a rate of 1 m^3/s. How is the diameter of the balloon changing at the instant when the radius of the balloon is 2 m ?
(a) $\frac{1}{16\pi}m/s$ (b) $\frac{1}{4\pi}m/s$
(c) $\frac{1}{8\pi}m/s$ (d) none of these

54. $\int_1^e\frac{\ln(x^2)}{x}dx$ A
(a) e (b) 0
(c) 1 (d) e - 1

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55. Find the arc-length of the curve given by the parametric equation $x = \frac{t^2}{\sqrt{2}}$ and $y = \frac{t^3}{3}$ where $0 \le t \le 1$.

(a) $\sqrt{2}+\sqrt{3}$ (b) $\sqrt{3}+\frac{2\sqrt{2}}{3}$

(c) $\sqrt{3}-\frac{2\sqrt{2}}{3}$ (d) $\sqrt{3}-\sqrt{2}$

56. Let w=log (u^2+v^2) where $u = e^{(x^2+y)}$ and $v = e^{(x+y^2)}$. Then $\left.\frac{\partial w}{\partial x}\right|_{x=0,\ y=0}$

(a) 1 (b) 0
(c) 4 (d) 2

57. The differential equation of all the ellipse centred at the origin is;

(a) $xyy''+x(y')^2-yy'=0$ (b) $y^2+x(y')^2-yy'=0$
(c) $yy''+x(y')^2-xy'=0$ (d) none of these

58. Let X be a binomial random variable with n=5 and p=0.5 and Y=X mod 2. Probability of Y=0 is;

(a) $\frac{1}{2^3}$ (b) $\frac{1}{2^5}$

(c) 1 (d) $\frac{1}{2}$

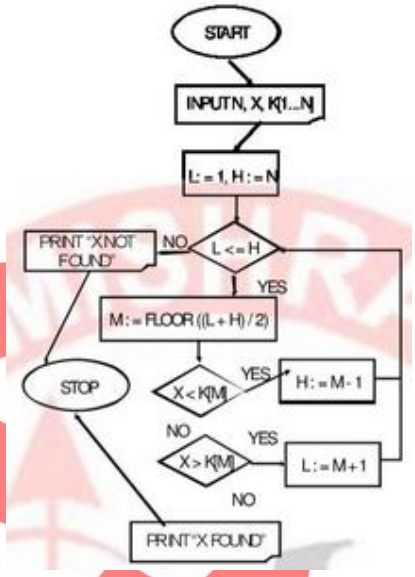
59. A 120 gallon tank initially contains 90 lb of salt dissolved in 90 gallons of water. Solution containing 2 lb/gallon of salf flows into the tank at the rate of 4 gallons/min and the well –stirred mix-true flow out of the tank at the rate of 3 gallons/min. A differential equation for the amount x(in lb) of salt in the tank is;

(a) $\frac{dx}{dt}+\frac{3x}{90+2t}=4$ (b) $\frac{dx}{dt}+\frac{x}{30}=8$

(c) $\frac{dx}{dt}+90x=2$ (d) $\frac{dx}{dt}+\frac{3x}{90+t}=8$

60. If the following are the elements in K, 3 7 9 16 73 97 683 923 3883 9003 then the number of iterations to determine whether 7 is in Kis;

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



61. How many total iterations are needed to find it an element is not in K given that there are N element in K ?

(a) N^2 (b) N
(c) N – 1 (d) log N

62. If the following are elements in K, 3 5 7 12 17 28 49 67 89 101 121 138 147 164 189 201 220 245 567 879 903 1001, what is the number pointed to by M ?

(a) 345 (b) 567
(c) 903 (d) 879

63. A teacher tells her students that although she always use an average to calculate their course grades, she gives more weight to the final exam grade. She assures students that if they can perform well on final, then even if they performed poorly on the other exams, they must have learned the material. For three semesters she kept track of how students did on the final and how they did in the course which is given below. What is the probability that a student, taken at random from the class, would have passed her course ?

	Course	
Final	Pass	Fail
Pass	142	34
Fail	89	56

(a) 0.52 (b) 0.62
(c) 0.42 (d) 0.72

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64. Let $f : R \to R$ be the function defined by $f(x) = \frac{\sin x}{|x| + \cos x}$ Then;

(a) f is not differentiable at x=0
(b) f is differentiable at all $x \in R$
(c) f is differentiable at x=0 but f' is not continuous at x=0
(d) f is not differentiable at $x - \frac{\pi}{2}$

65. If f is continuous function on the closed interval [a, b], which of the following MUST be true ?
(a) There is a number c in the open interval (a, b) such that f(a)<f(c)<f(b).
(b) There is a number c in the open interval (a, b) such that f(c)=0.
(c) There is a number c in the open interval (a, b) such that f'(c)=0.
(d) There is a number c in the closed interval [a, b] such that $f(c) \geq f(x)$ for all $x \in [a,b]$.

66. The differential equation $\frac{dy}{dx} = (x + y + 1)^2$ is;

(a) linear (b) separable
(c) homogeneous (d) none of these

67. If $\int_0^1 f(x)dx = 2$ and $\int_0^1 f(x)dx = -3$ then $\int_1^4 (3f(x) + 2)dx =$

(a) –9 (b) -13
(c) 21 (d) 3

68. In the interval $(-2\pi, 0)$ the function $f(x) = \sin\left(\frac{1}{x^3}\right)$ changes sign;
(a) one
(b) never
(c) infinite number of times
(d) more than once but finite number of times

69. A set $S = \left\{ s \mid s = \frac{3m+5}{m+2}, m \geq 0 \right\}$ has
(a) neither a minimum element nor a maximum element in it.
(b) both maximum and minimum element in it.
(c) a maximum element but not a minimum element in it.
(d) a minimum element but not a maximum element it it.

70. Let function $f : X \to X$ and g is its inverse function i.e., g o $f(x) = x$, $\forall x \in X$ then
(a) f must be 1-to-1 but not always onto.
(b) f is always 1-to-1 and onto
(c) f must be onto but not always 1-to-1
(d) none of the above is always true

71. Centers of two circles are separated by 30 cms. Radius of first circle is 40 cm and radius of second circle is 50 cm. What is the length of the common chord ?
(a) 48 (b) 24
(c) 56 (d) 40

72. Which of the following are true for all real values of x? All arguments are given in radians.

I. $\sin\left(\frac{\pi}{2} + x\right) = \cos\left(\frac{\pi}{2} - x\right)$

II. $2 + 2\sin(x) - \cos^2(x) \geq 0$

III. $\sin\left(x + \frac{3\pi}{2}\right) = \cos(\pi - x)$

IV. $\sin(x)\cos(x) \leq \frac{1}{4}$

(a) I and III (b) I and II
(c) II and III (d) III and IV

73. For all sets A, B and C which of the following statements is True ?
(a) $(A - B) \cap (C - B) = (AC) - B$
(b) $A - (B - C) = (A - B) - C$
(c) If $A \cap C = B \cap C$ then $A = B$
(d) If $A \cap C = B \cap (C - B) = A - (B \cup C)$

74. Which among the following functions is not periodic
(a) $e^{\cos(x)}$ (b) $\log_e(\sin(x))$
(c) $\sin(e^x)$ (d) $\frac{10}{100 + \sin(x) + \cos(x)}$

75. The number of roots of the equation $X^2 + \sin^2(X) = 1$ in the closed interval $\left[0, \frac{\pi}{2}\right]$ is;

(a) 1 (b) 0
(c) infinite (d) finite & greater than 1

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ANSWERS

1. B	2. A	3. C	4. C	5. A
6. A	7. B	8. A	9. D	10. C
11. D	12. B	13. C	14. B	15. A
16. D	17. A	18. A	19. C	20. C
21. A	22. D	23. A	24. D	25. B
26. C	27. D	28. D	29. D	30. C
31. B	32. B	33. A	34. D	35. B
36. B	37. B	38. A	39. D	40. B
41. B	42. A	43. D	44. B	45. C
46. C	47. D	48. B	49. D	50. A
51. C	52. B	53. C	54. C	55. C
56. A	57. A	58.	59. D	60. A
61. D	62. D	63. A	64. D	65. B
66. B	67. A	68. D	69. A	70. B
71. A	72. C	73. A	74. C	75. B