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1. Evaluate $\sum_{r=3}^{10} (5r + 2)$.

- (a) 265 (b) 276
(c) 297 (d) None of the above

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2. What is the volume of a cube?

Statement I:

The area of each face of the cube is 64 square metres.

Statement II:

The length of one side of the cube is 8 metres.

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- (a) Statement (I) alone is sufficient to answer the question.
(b) Statement (II) alone is sufficient to answer the question.
(c) Statement (I) or Statement (II) alone is sufficient.
(d) Statement (I) and (II) together are necessary to answer the question.

3. What is/are true from the list given below?

- A. Radix of any number system is the number of digits required to represent all numerical values in that system.
B. Base of any number system is the number of digits required to represent all numerical values in that system.
C. Radix is the exponent value of a number in any number system.
D. Base is the exponent value of a number in any number system.

Choose the correct answer from the options given below

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- (a) A and B only (b) A and D only
(c) B and C only (d) All A, B, C, D

4. $f(n) = \int_0^{\pi} \tan^n x dx$, then the value of $f(3) + f(1)$ is equal to

- (a) 1 (b) 1/2 (c) 0 (d) 3/2

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5. Find the domain and range of the function $f: \mathbb{R} \rightarrow \mathbb{R}$,

$$f(x) = \frac{3x-1}{x-3}$$

- A. $\{x \in \mathbb{R} : x \neq 3\}$
B. $\{x \in \mathbb{R} : x \neq 1/3\}$
C. $\{y \in \mathbb{R} : y \neq 3\}$
D. $\{y \in \mathbb{R} : y \neq 1/3\}$

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- (a) A and C only (b) A and D only
(c) B and C only (d) B and D only

6. $f(x) = \frac{1}{1+\sqrt{x}}$ and $g(x) = x + 7$. Then, the value of x at which $(f^{-1} \circ g^{-1})(x) = 9$ is :

- A. $x = \frac{29}{4}$ B. $x = \frac{13}{2}$
C. $x = \frac{19}{2}$ D. $x = \frac{23}{4}$

Choose the correct answer from the options given below.

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- (a) A and B only (b) A and C only
(c) B and D only (d) C and D only

7. What is the Excess-3 code for $(45)_{10}$?

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- (a) 0111 0101 (b) 0111 1000
(c) 0111 1010 (d) 0111 1001

8. If ${}^{2n}C_3 : {}^nC_2 = 11 : 1$, what is the value of n ?

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- (a) 4 (b) 5
(c) 6 (d) None of the above

9. Let $2\tan^2x + \sec^2x = 2$, $0 \leq x \leq 2\pi$. Then, the possible solutions of x are :

- A. $\frac{\pi}{6}$ B. $\frac{5\pi}{6}$ C. $\frac{\pi}{3}$ D. $\frac{11\pi}{6}$ E. $\frac{\pi}{4}$

Choose the correct answer from the options given below.

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- (a) A and B only (b) A, B and D only
(c) D and C only (d) D and E only

10. The value of $\int_0^{\infty} \int_x^{\infty} \frac{e^{-y}}{y} dy dx$ by changing the order of integration is :

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

11. If $(G, *)$ is a cyclic group of order 73, then the number of generator of G is equal to :

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- (a) 89 (b) 23 (c) 72 (d) 17

12. Given that :

X	1	2	3	4	5
U	2	5	10	20	30

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- (a) $\Delta = \nabla E^{-1}$ (b) $\Delta = E + I$
(c) $\Delta^2 u_4 = u_4 - 2u_3 - u_2$ (d) $\nabla^2 u_4 = 5$

13. Find the biggest fraction among the following:

- $\frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \frac{11}{13}, \frac{13}{15}$

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- (a) $\frac{5}{7}$ (b) $\frac{9}{11}$ (c) $\frac{11}{13}$ (d) $\frac{13}{15}$

14. Consider a graph where

$$V(G) = \{P, Q, R, S\}$$

$$E(G) = \{(P, Q), (Q, R), (R, S), (S, Q)\}$$

The degree of each vertices P, Q, R, S respectively in G are as follows :

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- (a) 1, 1, 1, 1 (b) 1, 3, 2, 2
(c) 1, 2, 2, 3 (d) 1, 2, 3, 2

15. Given below are two Statements.

Statement I:

Let the function $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as

$$f(x) = \begin{cases} x & \text{if } x > 2 \\ 5x-2 & \text{if } x \leq 2 \end{cases}$$

then, $f(x)$ is onto.

Statement II:

Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined as $f(x) = x^2$.

Then $f(x)$ is one-one.

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- (a) Both Statement I and Statement II are true
(b) Both Statement I and Statement II are false

- (c) Statement I is correct, but Statement II is false.
 (d) Statement I is incorrect, but Statement II is true.
16. If $2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\hat{i} + 2\hat{j} + 3\hat{k}$ are two different sides of rhombus, then the length of the diagonals are:

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- (a) $7, \sqrt{69}$ (b) $6, \sqrt{59}$
 (c) $5, \sqrt{65}$ (d) $8, \sqrt{45}$

17. Find the odd man out.
 3, 5, 7, 12, 17, 19

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- (a) 19 (b) 17 (c) 7 (d) 12

18. Given below are two Statements.

Statement I:

Let n be a positive integer greater than 3. Then, $(n^3 - 8)$ can never be a prime number.

Statement II:

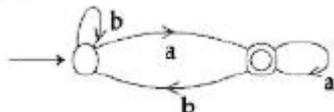
Let n be a positive integer. Then, $(2n + 1)^2 - (2n - 1)^2$ will be always divisible by 8.

In the light of the above statements, choose the most appropriate answer from the options given below.

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- (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.

19. What is the language accepted by the following automation?



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- (a) $(a + b)^*(a + b)$ (b) $(a + b)^*a$
 (c) $(a + b)^*$ (d) a^*b

20. Find the value of the integral $\int_{-\pi}^{\pi} \frac{\cos^2 x}{1 + a^x} dx$, where $a > 0$.

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- (a) $\frac{\pi}{2}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{6}$

21. If a variable X has the p.d.f

$f(x) = \frac{1}{4}xe^{-x/2}, 0 < x < \infty$, then the distribution has mean and variance as :

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- (a) mean = 2 and variance = 4
 (b) mean = $\frac{1}{2}$ and variance = $\frac{1}{4}$
 (c) mean = 4 and variance = 2
 (d) mean = 4 and variance = 8

22. $\frac{\sin \theta + \cos \theta}{\sin \theta - \cos \theta} = 3$, then the value of $\sin 4\theta - \cos 4\theta$ is :

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- (a) 1/5 (b) 3/5 (c) 2/5 (d) 4/5

23. MK : 1311 :: HJ : ?

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- (a) 911 (b) 1011 (c) 810 (d) 710

24. $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$, then :

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- (a) $A^3 - 3A^2 + 6A - 4I = 0$
 (b) $2A^3 - 2A^2 + 4I = 0$
 (c) $A^3 - A^2 + A + I = 0$
 (d) None of these

25. If the points $(-1, -1, 2)$, $(2, m, 5)$ and $(3, 11, 6)$ are collinear, then the value of m is :

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- (a) 5 (b) 3 (c) 4 (d) 8

26. A, B and C can paint a wall in 22 days. If A takes 99 days and B takes 36 days to paint the wall, how many days will C take to paint it alone?

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- (a) 66 (b) 72 (c) 132 (d) None of these

27. Let G be a group with 8 elements. Let H be a subgroup of G . It is given that the size of H is at least 3.

Then, the size of H will be :

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- (a) 8 (b) 2 (c) 3 (d) 4

28. Find the eigenvalues of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$.

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- (a) 0, 0, 0 (b) 0, 0, 1
 (c) 0, 0, 2 (d) 0, 0, 3

29. If interrupt occurs during the execution of a program, then it :

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- (a) follows the next instruction in the program
 (b) jumps to instruction in other registers
 (c) breaks the normal sequence of execution of instructions (Correct Answer)
 (d) stops executing the program

30. Consider the following 'C' declaration.

```
struct {
    short s[5];
    union {
        flo at y;
        long z;
    } n;
} t;
```

Assume that objects of type short, float and long occupy 2 bytes, 4 bytes and 8 bytes respectively. What will be the memory requirement for variable, ignoring alignment consideration?

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- (a) 22 Bytes (b) 14 Bytes
 (c) 18 Bytes (d) 10 Bytes

31. If ${}^nC_{r-1} = 36$, ${}^nC_r = 84$ and ${}^nC_{r+1} = 136$, what will be the value of n ?

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- (a) 3 (b) 5 (c) 7 (d) 9

32. If $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$ and unit vector \vec{c} are coplanar vectors such that \vec{c} and \vec{a} are perpendicular, then \vec{c} is :

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- (a) $\frac{-i+k}{\sqrt{2}}$ (b) $\frac{-i-k}{\sqrt{3}}$
 (c) $\frac{i-2j}{\sqrt{5}}$ (d) $\frac{i-j-k}{\sqrt{3}}$

33. Statement I:

The equation of the parabola, whose focus is the point (2, 3) and directrix is the line $x - 4y + 3 = 0$, is $16x^2 + y^2 + 8xy - 74x - 78y + 212 = 0$.

Statement II:

The eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ which passes through the points (3, 0) and $(3\sqrt{2}, 2)$ is

$$\frac{\sqrt{13}}{3}.$$

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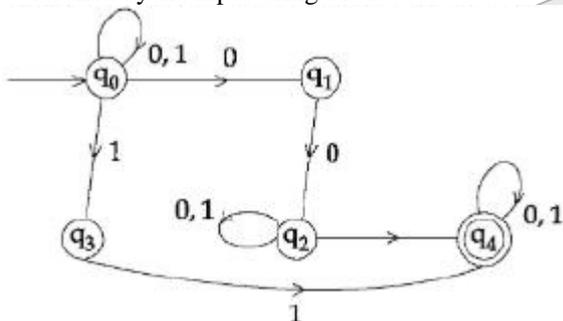
- (a) Both Statement I and Statement II are true.
 (b) Both Statement I and Statement II are false.
 (c) Statement I is correct, but Statement II is false.
 (d) Statement I is incorrect, but Statement II is true.

34. The minimum value of $2\sin^2\theta + 3\cos^2\theta$ is :

- (a) 0 (b) 3 (c) 2 (d) 1

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35. Consider the given N DFA and determine the states reached by the input string 0101.



- (a) $\{q_0, q_3, q_4\}$ (b) $\{q_0, q_1, q_2\}$
 (c) $\{q_1, q_2, q_3\}$ (d) $\{q_1, q_2, q_4\}$

36. An OR gate has 6 inputs. What is the only input word that produces a 0 output?

- (a) 000000 (b) 000111
 (c) 111000 (d) 111111

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37. The value of $\cos \frac{\pi}{5} \cos \frac{2\pi}{5} \cos \frac{4\pi}{5} \cos \frac{8\pi}{5}$ is :

- (a) 1/16 (b) 0 (c) 4/5 (d) -1/16

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38. The Newton divided difference polynomial which interpolate the data $f(0) = 1, f(1) = 3, f(3) = 55$ is :

- (a) $8x^2 + 6x + 1$ (b) $8x^2 - 6x + 1$
 (c) $8x^2 - 6x - 1$ (d) $8x^2 + 6x - 1$

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39. $\tan \alpha = \frac{m}{m+1}$ and $\tan \beta = \frac{1}{2m+1}$, then $\alpha + \beta = \dots$

- (a) $\frac{\pi}{4}$ (b) $-\frac{\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) $-\frac{3\pi}{4}$

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40. The height of binary tree is the maximum number of edges in any root to leaf path. The maximum number of nodes in a binary tree of height h is :

- (a) 2^h (b) $2^{h-1} - 1$
 (c) $2^{h+1} - 1$ (d) 2^{h+1}

41. Three wheels can complete respectively 60, 36, 24 revolutions per minute. There is a white spot on each wheel that touches the ground at time zero. After how much time, all these spots will simultaneously touch the ground again?

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- (a) 5 (b) 10 (c) 7 (d) 6

42. Given a complete graph of 'n' vertices, how many Hamiltonian circuits are possible?

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- (a) n! (b) (n - 1)!
 (c) n² (d) nⁿ

43. For what value of k, the function

$$f(x, y) = \begin{cases} \frac{\sin^{-1}(xy-2)}{\tan^{-1}(3xy-6)}, & (x, y) \neq (1, 2) \\ k, & (x, y) = (1, 2) \end{cases}$$

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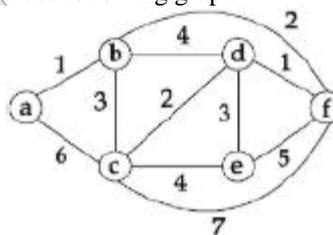
- (a) 1/2 (b) 1/3 (c) 1/4 (d) 3/4

44. The equation of the ellipse whose centre is at the origin and the x-axis, the major axis, passing through the points (-3, 1) and (2, -2) is given by :

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- (a) $5x^2 + 3y^2 = 32$ (b) $3x^2 + 5y^2 = 32$
 (c) $5x^2 - 3y^2 = 32$ (d) $3x^2 + 5y^2 = -32$

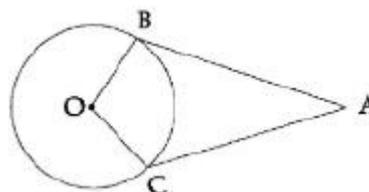
45. Consider the following graph.



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- (a) (a-b), (d-f), (b-f), (d-c), (d-e)
 (b) (a-b), (d-f), (d-c), (b-f), (d-e)
 (c) (d-f), (a-b), (d-c), (b-f), (d-e)
 (d) (d-f), (a-b), (b-f), (d-e), (d-c)

46. Find the area of the quadrilateral ABOC, given that the diameter of the circle is 20 cm and AB = 18cm



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- (a) 185 (b) 180 (c) 179 (d) 178

47. Which of the following is always odd?

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- (a) Sum of two odd numbers
 (b) Difference of two odd numbers
 (c) Product of two odd numbers (Correct Answer)
 (d) None of these

48. Suppose a coin, weighted so that $P(H) = \frac{2}{3}$ and

$P(T) = \frac{1}{3}$, is tossed. If head appears, then a number

is selected at random from {1, 2, 3, 4, 5, 6, 7, 8, 9}; if tail appears, then a number is selected from {1, 2, 3, 4, 5}. Then the probability that an even number 'Ev' appears.

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- (a) $\frac{58}{135}$ (b) $\frac{68}{135}$ (c) $\frac{77}{135}$ (d) $\frac{87}{135}$

49. Which kind of multiplexing scheme is adopted by Von-Newmann Architecture especially for program and data fetching purposes ?

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- (a) Time Division Multiplexing (Correct Answer)
 (b) Frequency Division Multiplexing
 (c) Statistical Time Division Multiplexing
 (d) Code Division Multiplexing

50. The result of evaluating the postfix expression 5 4 6 + * 4 9 3 1 + *

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- (a) 600 (b) 350 (c) 650 (d) 588

51. The functional capacity for SSI devices is :

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- (a) 1 to 11 gates
 (b) 12 to 99 gates
 (c) 100 to 10000 gates
 (d) More than 10000 gates

52. Statements : All trains are not planes.

All planes are cars.

Conclusions : (A) Some cars are not trains.

(B) Some trains are cars.

Choose the correct answer from the options given below.

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- (a) (A) only
 (b) (B) only
 (c) (A) and (B) only
 (d) (A) or (B) only

53. The position vector of the point which divides the join of points with position vectors $\vec{a} + \vec{b}$ and $2\vec{a} - \vec{b}$ in the ratio 1 : 2 is :

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- (a) $\frac{3\vec{a} + 2\vec{b}}{3}$ (b) \vec{a}
 (c) $\frac{5\vec{a} - \vec{b}}{3}$ (d) $\frac{4\vec{a} + \vec{b}}{3}$

54. Solve the inequality $\frac{(x-3)^2(x+7)}{(4-x)} < 0$.

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- (a) $x < -7$ or $x > 4$ (b) $x > -7$ or $x < 4$
 (c) $x < -3$ or $x > 4$ (d) $x > -3$ or $x < 4$

55. Let $X_k = (P_1 P_2 \dots P_k) + 1$, where P_1, P_2, \dots, P_k are the first k primes.

Consider the following :

- A. X_k is a prime number
 B. X_k is a composite number
 C. X_{k+1} is always an even number

Choose the correct answer from the options given below.

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- (a) A only (b) B only
 (c) C only (d) A and C only

56. The base of the triangle is increased by 40%. What can be the maximum percentage increase in the

length of the height so that the increase in area is restricted to a maximum of 60% ?

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- (a) 14.95% (b) 14.98%
 (c) 14.28% (d) 14.45%

57. A point moves such that its distance from the point (4, 0) is half that of its distance from the line $x = 16$. The locus of the point is :

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- (a) $3x^2 + 4y^2 = 192$ (b) $4x^2 + 3y^2 = 192$
 (c) $x^2 + y^2 = 192$ (d) None of these

58. If $f(x) = ce^{-(x^2-6x+9)/32}$, $-\infty < x < \infty$, represents a normal distribution, find the value of c, the mean μ and the variance σ^2 of the distribution

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- (a) $\mu = 3, \sigma^2 = 16, c = \frac{1}{4\sqrt{2\pi}}$
 (b) $\mu = 4, \sigma^2 = 16, c = \frac{1}{4\sqrt{2\pi}}$
 (c) $\mu = 3, \sigma^2 = 15, c = \frac{1}{4\sqrt{2\pi}}$
 (d) $\mu = 3, \sigma^2 = 16, c = \frac{1}{2\sqrt{2\pi}}$

59. The perimeter of a rectangular field is 480 metres and the ratio between the length and the breadth is 5 : 3. The area is :

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- (a) 1350 sq.m. (b) 1550 sq.m.
 (c) 13500 sq.m. (d) 15500 sq.m.

60. If $x \cos \theta - y \sin \theta = \sqrt{x^2 + y^2}$ and $\frac{\cos^2 \theta}{a^2} + \frac{\sin^2 \theta}{b^2} = \frac{1}{x^2 + y^2}$, then the correct relation is :

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- (a) $\frac{x^2}{b^2} - \frac{y^2}{a^2} = 1$ (b) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
 (c) $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$ (d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

61. What will be the maximum number of centre in a Tree ?

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- (a) One (b) Two
 (c) Three (d) Infinite

62. Choose the 'ODD' man out : UW, DF, GI, LP.

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- (a) UW (b) DF (c) GI (d) LP

63. If the MAX_SIZE is the size of the array used in the implementation of circular queue, assume array index start with 0, front points towards the first element in the queue, and rear points towards the last element in the queue. Which of the following condition specify that circular queue is Full ?

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- (a) Front = rear = - 1
 (b) Front = (rear + 1)%MAX_SIZE
 (c) Rear = front + 1
 (d) Rear = (front + 1)%MAX_SIZE

64. YSDG : GDSY :: _____ : IOTU.

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(a) UTOI (b) VUPJ (c) TVSJ (d) STIO

65. The minimum number of NAND gates required to implement Boolean Function :

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(a) Zero (Correct Answer) (b) 1
(c) 4 (d) 7

66. If G be a group such that $a^2 = e, \forall a \in G$, then G is :

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(a) abelian (b) non-abelian group
(c) ring (d) field

67. What will be the output of following 'C' code ?

```
main()
{
    int i = 1, j = 2;
    switch (i)
    {
        case i : printf ("GOOD");
                break;
        case j : printf ("BYE");
                break;
    }
}
```

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(a) GOOD (b) GOODBYE
(c) Compilation Error (d) Runtime Error

68. The third divided difference of $1/x$ based on the points x_0, x_1, x_2, x_3 is :

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(a) $\frac{-1}{x_0 x_1 x_2 x_3}$ (b) $\frac{1}{x_0 x_1 x_2 x_3}$
(c) $\frac{-1}{x_0 x_1 x_2}$ (d) $\frac{1}{x_0 x_1 x_2}$

69. Let a quadratic function be defined on $[a, b]$ by $f(x) = \alpha x^2 + \beta x + \gamma, \alpha \neq 0$. Then, the real number 'c' guaranteed by Lagrange's mean value theorem is equal to :

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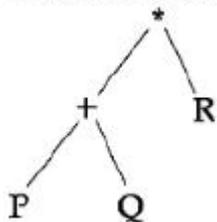
(a) $\frac{a+b}{2}$ (b) \sqrt{ab}
(c) $\frac{2ab}{a+b}$ (d) $\frac{a}{b} + \frac{b}{a}$

70. Find the value of y in $y^2 - 10y + 24 = 0$.

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(a) 6 or 4 (b) 4 or 3
(c) 3 or 2 (d) 1 or 5

71. Which of the following is represented by parse tree?



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(a) $P * R + Q$ (b) $P + Q * R$
(c) $P + * Q R$ (d) $(P + Q) * R$

72. The equation of the straight line passing through (1, 2) and perpendicular to the line $x + y + 7 = 0$ is :

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(a) $x - y = -1$ (b) $x + y = 1$
(c) $x + 2y = 1$ (d) $x - 3y = 1$

73. Find the value of $f\left(\frac{1}{\sqrt{3}}\right)$ when

$$\int_{\sin x}^1 t^2 f(t) dt = 1 - \sin x, \forall x \in \left[0, \frac{\pi}{2}\right].$$

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

74. If three unbiased coins are tossed, find the probability of getting (i) at least two tails, and (ii) at most two tails.

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(a) $\frac{1}{2}, \frac{3}{8}$ (b) $\frac{1}{2}, \frac{5}{8}$ (c) $\frac{1}{2}, \frac{7}{8}$ (d) $\frac{1}{2}, \frac{1}{8}$

75. A cache has 64 blocks with block size of 16 bytes. A block in main memory having address 1200 has to be mapped into cache using direct mapping method. What would be the corresponding block number in cache?

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(a) 11 (b) 12
(c) 13 (d) None of the above

76. Consider the following 'C' declaration.

```
Struct node {
    int i;
    float j;
};
```

struct node *s[10];
Of the following, how to define s ?

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(a) An array, each element of which is a pointer to a structure of type node.
(b) A structure of 2 fields, each field being a pointer to an array of 10 elements.
(c) A structure of 3 fields; an integer, a float and an array of 10 elements.
(d) An array, each element of which is a structure of type node.

77. A man said to a woman, 'I am your husband's father-in-law's wife's only son'. How can the woman be related to the man ?

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(a) Daughter (b) Aunt
(c) Daughter-in-law (d) Sister

78. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors such that $\vec{a} + \vec{b} + \vec{c} = 0$. then the value of $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$ is :

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(a) 1 (b) -3
(c) $\frac{-3}{2}$ (d) None of these

79. The moment generating function of the random variables X, whose moments are $\mu_r = r!2^r$, is :

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(a) $(1 - 2t)^{-1}$ (b) $(1 - 2t)^{-2}$
(c) $(1 - 2t)^{-3}$ (d) $\frac{1}{2t}$

80. Statement I: 'C' Programming language allows the recursion of a function.
Statement II: Recursion of main() function in 'C' language is possible.

In the light of the above statements, choose the correct answer from the options given below.

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- (a) Both Statement I and Statement II are true
- (b) Both Statement I and Statement II are false
- (c) Statement I is correct, but Statement II is false
- (d) Statement I is incorrect, but Statement II is true

81. Find the next term in the series.
1, 2, 6, 15, 31, ?

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- (a) 49 (b) 52 (c) 56 (d) 57

82. Statement I:

Circle on which the co-ordinates of any point are $(2 + 4\cos\theta, -1 + 4\sin\theta)$, where θ is parameter, is given by $(x - 2)^2 + (y + 1)^2 = 16$.

Statement II:

The equation of the circle which passes through the point $(4, 5)$ and has its centre at $(2, 2)$ is $(x - 2)^2 + (y - 2)^2 = 11$.

In the light of the above statements, choose the correct answer from the options given below.

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- (a) Both Statement I and Statement II are true.
- (b) Both Statement I and Statement II are false.
- (c) Statement I is correct, but Statement II is false.
- (d) Statement I is incorrect, but Statement II is true.

83. The price of 357 mangoes is Rs. 1517.25. What will be the approximate price of 49 dozens of such mangoes ?

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- (a) 3000 (b) 3500 (c) 4000 (d) 2500

84. Consider the following 'C' declaration,
`int *A [10], B[10][10];`

Of the following expression, which will not give compile-time errors if used as left hand sides of assignment statements?

- A. `A[2]`
- B. `A[2] [3]`
- C. `B[1]`
- D. `B[2] [3]`

Choose the correct answer from the options given below.

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- (a) A, B and D only (b) B, C and D only
- (c) C and D only (d) D only

85. Given below are two statements.

Statement I:

The order of every element of a finite group is infinite.

Statement II:

If there is no positive integer n such that $an = e$, then the order of a denoted by $O(a)$, is infinite or zero.

In the light of the above statements, choose the most appropriate answer from the options given below.

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- (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

86. The equation of the circle having centre $(1, -2)$ and passing through the point of intersection of the lines $3x + y = 14$ and $2x + 5y = 18$ is :

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- (a) $x^2 + y^2 - 2x + 4y - 20 = 0$

(b) $x^2 + y^2 - 2x - 4y - 20 = 0$

(c) $x^2 + y^2 + 2x - 4y - 20 = 0$

(d) $x^2 + y^2 + 2x + 4y - 20 = 0$

87. Let G be a group of order 30. Let A and B be normal subgroups of order 2 and 5, respectively. Then, the

order of the group $\frac{G}{AB}$ is :

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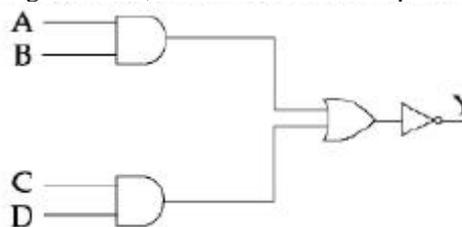
- (a) 10 (b) 3 (c) 2 (d) 5

88. Assuming that only the X and Y logic inputs are available and their complements \bar{X} and \bar{Y} are not available, what is the minimum number of two input NAND gates required to implement $X \oplus Y$?

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- (a) 2 (b) 3 (c) 4 (d) 5

89. In figure below, what is the Boolean equation?



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- (a) $Y = \overline{AB + D}$ (b) $Y = \overline{AB + CD}$
- (c) $Y = \overline{(A + B) \cdot (C + D)}$ (d) None of the above

90. If $x^6 - y^6 = 0$, what is the value of $x^3 - y^3$?

- (I) x is positive
- (II) y is greater than 1

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- (a) (I) only
- (b) (II) only
- (c) (I) and (II) both are necessary
- (d) Either (I) or (II)

91. The value of the determinant

$$\begin{vmatrix} \operatorname{cosec}^2 \theta & \cot^2 \theta & 1 \\ \cot^2 \theta & \operatorname{cosec}^2 \theta & -1 \\ 42 & 40 & 2 \end{vmatrix} \text{ is :}$$

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- (a) 0 (b) 1
- (c) -1 (d) None of these

92. The Boolean expression $AB + A\bar{B} + \bar{A}C + AC$ is independent of the Boolean variable:

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- (a) A (b) B
- (c) C (d) None of the above

93. Statements : All the fools are genius.

No genius is a cricketer.

Conclusions :

- (A) All the geniuses are fools.
- (B) Some fools are not cricketers.
- (C) No fool is a cricketer.
- (D) All cricketers are fools.

Choose the correct answer from the options given below :

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- (a) (C) only (b) (B), (C), (D) only
- (c) (B) and (C) only (d) (A) and (D) only

94. Consider these 'C' code to swap two integers.
`void swap (int *x, *y)`

```
{
    *x = *x - *y;
    *y = *x + *y;
    *x = *y - *x;
}
```

- A. Will generate a compilation error.
 - B. May generate a segmentation fault at runtime depending upon the arguments passed.
 - C. Correctly implements the swap procedure for all input pointers referring to integers stored in memory locations accessible to processes.
 - D. Implements the swap procedure correctly for some but not all valid input pointers.
 - E. May add or subtract integers and pointers.
- Choose the correct answer from the options given below.

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- (a) A only
- (b) B and C only
- (c) B and D only
- (d) B and E only

95. Solve the inequality $\frac{2x+7}{|x|+1} < 3$.

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- (a) $x \in (-\infty, 4) \cup (7, \infty)$
- (b) $x \in \left(-\infty, \frac{-4}{5}\right) \cup (1, \infty)$
- (c) $x \in \left(-\infty, \frac{-4}{5}\right) \cup (4, \infty)$
- (d) $x \in (-\infty, 1) \cup (4, \infty)$

96. If $G = \{1, -1, i, -i\}$ is a multiplicative group, then order of (-i) is :
- A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. none of these
- Choose the most appropriate answer from the options given below.

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

97. Given below are two Statements.
- Statement I:
The interval of values of x for which $f(x) = 3x^2 - 6x + 2$ is decreasing is $(-\infty, \infty)$.
- Statement II:
The interval of values of x for which $g(x) = 4x^3 + 7x - 2$ is increasing is $(-\infty, \infty)$.
- In the light of the above statements, choose the correct answer from the options given below.

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- (a) Both Statement I and Statement II are true
- (b) Both Statement I and Statement II are false
- (c) Statement I is correct, but Statement II is false.

- (d) Statement I is incorrect, but Statement II is true.
98. 4 Variable Boolean Function is given as :
 $F(A, B, C, D) = \Sigma(2, 3, 4, 5, 6, 7, 11, 14, 15)$
Simplify the above function in POS (Product Of Sum) form by a 4 Variable map.

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- (a) $(A + C)$
 - (b) $(A + B)$
 - (c) $(A' + C)(B + C)(A' + B + D)$
 - (d) None of the above
99. If X is a Poisson variate such that $P(X = 2) = 9P(X = 4) + 90P(X = 6)$, then the mean of the distribution is :

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- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
100. Given the following frequency distribution of income of employees.

Income Rs. /month	No. of employees
0 - 250	12
250 - 500	20
500 - 750	23
750 - 1,000	15
1,000 - 1,250	10
1,250 - 1,500	20

The median income of employees is :

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- (a) 625.00
- (b) 760.25
- (c) 695.65
- (d) 800.15

JNU-2020 Answers

1	2	3	4	5	6	7	8	9	10
B	C	A	B	A	A	B	D	B	C
11	12	13	14	15	16	17	18	19	20
C	D	D	B	C	A	D	A	B	A
21	22	23	24	25	26	27	28	29	30
B	C	C	D	D	C	D	D	C	C
31	32	33	34	35	36	37	38	39	40
D	A	A	C	A	A	D	B	A	C
41	42	43	44	45	46	47	48	49	50
A	B	B	B	D	B	C	A	A	B
51	52	53	54	55	56	57	58	59	60
A	A	D	A	D	C	A	A	C	B
61	62	63	64	65	66	67	68	69	70
B	D	B	A	A	A	C	A	A	A
71	72	73	74	75	76	77	78	79	80
D	A	A	C	A	A	D	C	A	A
81	82	83	84	85	86	87	88	89	90
C	C	D	A	D	A	B	C	B	C
91	92	93	94	95	96	97	98	99	100
A	B	C	B	C	C	D	C	A	C