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1. In C language, the memory can be allocated to a variable var at compile time by using

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(a) malloc (var) (b) calloc (var)
(c) realloc (var)
(d) declaring var with appropriate type

2. The COUNT function in SQL return the number of

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(a) Values (b) Distinct rows
(c) Distinct values (d) Distinct groups

3. The function (p V (r V q) ^ ~ (~Q ^ ~ r) is equal to the function

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(a) q V r (b) ((p V r) V q) ^ (q V r)
(c) (p V q) V (p ^ r) (d) (p V q) ^ ~ (p V r)

4. The value of the series $\sum \frac{1}{n^2}$ is

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(a) $\frac{\pi^2}{3}$ (b) $\frac{\pi^2}{4}$ (c) $\frac{\pi^2}{5}$ (d) $\frac{\pi^2}{6}$

5. The bitwise operator that can help make '0' as '1' of a particular bit in a number in C

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(a) %% (b) & (c) | (d) ||

6. An array of five pointers to integer is declared by

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(a) int *ptr[5](); (b) int *ptr[5];
(c) int (*ptr[5])(); (d) int **ptr[5];
(e) None of these

7. $\cos(\tan^{-1}(\sin(\cot^{-1}(x))))$ is

JNU-2019

(a) $\sqrt{\frac{1+x^2}{2+x^2}}$ (b) $\sqrt{\frac{1-x^2}{2+x^2}}$
(c) $\sqrt{\frac{1+x^2}{4+x^2}}$ (d) $\sqrt{\frac{x^2-1}{x^2-2}}$

8. The determinant $\begin{vmatrix} 1 & 5 & 3 \\ 1 & 10 & 6 \\ 1 & 15 & 9 \end{vmatrix}$ is

JNU-2019

(a) 0 (b) 3 (c) 5 (d) 6

9. In a cyclic group, the following is not correct.

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(a) It must have some generator
(b) It must be abelian
(c) there is no relation among the element
(d) generator need not be unique.

10. A. The product of two even permutations is even.
B. The product of two odd permutations is odd.

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(a) statement A is true
(b) statement B is true
(c) both statements A and B are true
(d) Both statements A and B are false

11. When a monkey's baby was 30 days old, it started eating banana and ate banana. Its appetite grew and each day it ate 3/2 times of the previous day. How old will it be when it can eat at least five bananas?

JNU-2019

(a) 32 (b) 34 (c) 38 (d) 40

12. Define R, a relation, on N × N : for all a, b, x, y in N, (a, b) R(x, y) iff ay = bx. Which is true?

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(a) R is reflexive only
(b) R is symmetric only
(c) R is transitive only
(d) all are true

13. Page stealing is related to

JNU-2019

(a) an efficient system
(b) taking page frames from other working set
(c) tuning the goal
(d) taking larger space from the disk space for pages, which are memory-out.

14. Let f be a mapping from A to B, where A and B are non-empty sets. Then f is a function only if

JNU-2019

(a) it is one-one (b) it is onto
(c) All element in B are associated with some element(s) of A
(d) None of these

15. The matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 1 & 4 \end{pmatrix}$ satisfies which one of the following properties?

JNU-2019

(a) symmetric (b) orthogonal
(c) Invertible (d) Singular

16. The value of the integral $\int_0^\infty \frac{\sin^2 x}{x^2} dx$ is

JNU-2019

(a) $\log_e \pi$ (b) $\pi/4$
(c) $\log_e 2$ (d) $\pi/2$

17. $(1110.01)_2$ is

JNU-2019

(a) $(14.25)_{10}$ (b) $(12.75)^{10}$
(c) $(13.25)_{10}$ (d) $(14.75)_{10}$

18. In a gathering of students, the probability of a student having tea is 0.5, that of a student having coffee is 0.7 and that of a student having neither tea nor coffee is 0.1. What is the probability of a student having both tea and coffee?

JNU-2019

(a) 0.1 (b) 0.3 (c) 0.4 (d) 0.5

19. Which of the following is a group?

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(a) Real numbers under multiplication
(b) Positive real numbers under multiplication
(c) Real n × n matrices under multiplication
(d) integers under multiplication

20. Let α, β be the roots of polynomial $f(x) = 2x^2 - 7x + 4$. The value of difference of the roots $|\alpha - \beta|$ is

JNU-2019

(a) 17/2 (b) 17 (c) $\frac{\sqrt{17}}{2}$ (d) $\sqrt{17}$

21. The quick sort method in average case has the order

JNU-2019

(a) O(n) (b) $O(n^2)$
(c) $O(n\log_2 n)$ (d) $O(n^2 - 1)$

22. How many different committees of 3 people consisting of 2 men and 1 woman can be made from a group consisting of 10 men and 7 women?

JNU-2019

(a) 630 (b) 315 (c) 70 (d) None of these

23. Which is not true about $s_n = \frac{1}{n}$?

JNU-2019

(a) sequence is converges to 0
(b) lim sup $s_n = 0$
(c) $\lim_{n\to\infty} \sum_{i=1}^{n} s_i = L$
(d) series $\sum s_n^2$ converges

24. The data structure used to hold a node is breath – first search in a graph is

JNU-2019

(a) tree (b) array
(c) queue (d) stack

25. The next term in the series is RLDR, SMCQ, TNBP, ….

JNU-2019

(a) UOAO (b) VOKO
(c) OKPR (d) WPST

26. The value of integral $\int_0^\infty \frac{x^{n+1}}{n+1} dx$, for $0 < n < 1$, is

JNU-2019

(a) $\frac{\pi}{\cot nx}$ (b) $\frac{\pi}{\cos nx}$
(c) $\frac{\pi}{\tan nx}$ (d) $\frac{\pi}{\sin nx}$

27. The method of computing the roots of polynomial equations have order of convergence in the order

JNU-2019

(a) Bisection method > secant method > Newton method
(b) Secant Method > bisection methjod > Newton Method
(c) Newton method > secant method > bisection method
(d) Secant Method > Newton method > bisection method.

28. for the curve $xy = \sqrt{x^2 + y^2}$, the slope $\frac{dy}{dx}$ at any point is given by

JNU-2019

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

29. If 'RIST' is written as '7614' and 'MTAL' is written as '5423'. Then, 'RAIL' written in the code as

JNU-2019

(a) 5429 (b) 7124 (c) 7263 (d) 6412

30. If $3^x.3^y.3^z = 81$, then $x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$ will be

JNU-2019

(a) 16 (b) 12 (c) 9 (d) 6

31. The value of $(-1)^{1/3}$ is

JNU-2019

(a) $\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}$ (b) $\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}$
(c) $\cos\frac{2\pi}{5} + i\sin\frac{2}{5}$ (d) $\cos\frac{3\pi}{7} + i\sin\frac{3\pi}{7}$

32. The key used to represent the relationship between two tables is called

JNU-2019

(a) Primary Key (b) Secondary Key
(c) Foreign Key (d) Super Key

33. The Values of scalars a, b such that for all vectors A and B, a(2A – 7B) + 2aB – 2(2A – bB) = 0 are

JNU-2019

(a) a = 3, b = 5 (b) a = 2, b = 5
(c) a = 1, b = 7 (d) a = 0, b = 3

34. Which of the following must be true for a continuous function on (a, b)?

JNU-2019

(a) function achieves its maximum on (a, b)
(b) function is bounded
(c) if f(a) = 5 and f(b) = 9, then f(c) = 7, for some c in (a, b)
(d) None of these

35. The Cartesian product $Z \times Z = \{(a, b) | a, b \in Z\}$ with operation + defined as x + y = (a + c, b + d). which is not correct?

JNU-2019

(a) it is associative
(b) it is commutative
(c) it has inverse of each element
(d) it has identity element as (1, 0)

36. A fair coin is tossed successively until a head appears. What is the chance of making at least 3 tosses?

JNU-2019

(a) $\frac{1}{4}$ (b) $\frac{3}{4}$ (c) $\frac{3}{8}$ (d) $\frac{3}{16}$

37. In a tree, the terminal nodes have degree

JNU-2019

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

38. The number of solutions of $\begin{pmatrix} 1 & 2 & 7 \\ 1 & 7 & 9 \\ 1 & 2 & 7 \end{pmatrix} x = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$ is

JNU-2019

(a) 0 (b) 1
(c) Infinite (d) None of the above

39. The declaration int(*p)() signifies

JNU-2019

(a) p is a pointer to a function
(b) p is a function of pointer variable
(c) p is a pointer to a function that returns int
(d) p is a function pointer

40. Playing is related to ground as Swimming is related to

JNU-2019

(a) water (b) Tank (c) Pool (d) Pond

41. The group (G, o) is commutative if, for all a, b in G, the following holds

JNU-2019

(a) $(aob)^{-1} = b^{-1}oa^{-1}$ (b) $(aob)^{-1} = a^{-1}ob^{-1}$
(c) $(aob)^{-1} = aob$ (d) $(aob)^{-1} = boa$

42. The remainder obtained after $x^4 + x^2 + x + 1$ is divided by $x^2 + x + 1$ is

JNU-2019

(a) 1 (b) x (c) x+1 (d) None

43. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is

JNU-2019

(a) 2 $\tan^{-1}$ (x) (b) 6 $\tan^{-1}$(x)
(c) $\sec^{-1}$(x) (d) 3 $\cot^{-1}$ (x)

44. Which is ODD word?

JNU-2019

(a) Centimeter (b) Inch
(c) Yard (d) Kiloliter

45. A rectangular vessel of size 2 cm × 5 cm × 8 cm full of water is emptited to a cylindrical container having the base diameter is 8 cm. Its height will be

JNU-2019

(a) $\frac{5}{\pi}$ (b) $\frac{15}{\pi}$ (c) $\frac{10}{\pi}$ (d) 20

46. $\sin^{-1}(x)+\sin^{-1}\left(\sqrt{1-x^2}\right)$ is

JNU-2019

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{4}$ (d) 1

47. Which is the most appropriate word for '?'?

Banana	Fruit	Market
Novels	?	Book Store

JNU-2019

(a) Vegetable (b) Shopping
(c) Story (d) Book

48. Let (G, o) be a group such that for all a, b in G, aob = a + b – 3.The identity element of this group is

JNU-2019

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

49. Let S be a string of 1's and 0's that is recursively defined as follows.
i. $1 \in S, 100 \in S$
ii. If $s \in S$, then $11s \in S$
iv. Nothing but strings generated as per rules 1 m2 and 3 are elements in S.
The following is not an element of S

JNU-2019

(a) 001 (b) 1100111
(c) 001100001 (d) 101100001

50. A digital system does not have a discrete element

JNU-2019

(a) Electric impulses (b) Decimal digits
(c) Arithmetic operations (d) 5 digital counters

51. If three cows graze the grass of a ground in eight days, how many cows can eat that grass in two days?

JNU-2019

(a) 6 (b) 9 (c) 12 (d) 15

52. Given that x = - 2 is a root of the polynomial f(x) = $x^3 - 19x - 30$, which of these is another root of f(x)?

JNU-2019

(a) 3 (b) 7 (c) 12 (d) 5

53. The attributes in an E – R diagram are represented by

JNU-2019

(a) circle (b) ellipse
(c) triangle (d) rectangle

54. The next term in the series 0, 1, 1, 2, 4, 17, 13, ….

JNU-2019

(a) 24 (b) 18 (c) 20 (d) 22

55. Fragmentation in a file system

JNU-2019

(a) occurs in file system is not used properly
(b) can always be prevented
(c) can temporarily be removed by compaction
(d) can be removed by deleting temporary file

56. A taxi car needs to go from city A to city B. which are 300 km aprt. It covers one third of this distance at the speed 100 km/h. one fifth of the remaining in 2 hours and the rest of the distance at the speed of 80 Km/h. The average speed of the taxi car is

JNU-2019

(a) 90 km/h (b) 80 km/h
(c) 70 km/h (d) 60 km/h

57. The distance of the point P(5, 2) to the line passing through (1, 4) and (4, 0) is

JNU-2019

(a) 2 (b) 5 (c) 8 (d) 10

58. The average of three numbers a, b and z is (a + b) – ab. Then z will be

JNU-2019

(a) (a + b)/ab – 3ab (b) 2(a + b) – 3ab
(c) 3(a + b) – ab (d) 3(a + b) – 3ab

59.
```
#includede<stdio.h>
int main()
{
FILE *fp, *fq, *fr;
fp = fopen("file 1.c", "r");
fp = fopen("file 2.c", "r");
fp = fopen("file 3.c", "r");
fclose(fp, fq, fr);
return 0;
}
```
The files can be closed using fclose() in this program is

JNU-2019

(a) file 1. C, file2.c, file3.c
(b) file1.c, file2.c
(c) file1.c
(d) None of them

60. Mohan walks 5 cm toward right, takes a left turn and walks 10 cm again. He then takes another left turn and walks 15 cm. He then take a final left turn and walks 10 cm before stopping. He is from the starting point at the distance of

JNU-2019

(a) 20 cm (b) 15 cm
(c) 10 cm (d) 5 cm

61. The operation that makes a transaction permanent in database is

JNU-2019

(a) View (b) Commit
(c) Rollback (d) Flashback

62. The magnitude of the vector (4, - 3,2) is

JNU-2019

(a) 5 (b) 6 (c) 8 (d) $\sqrt{29}$

63. Which word is ODD among the following?

JNU-2019

(a) Seat (b) Steering wheel
(c) Wiper (d) car

64. The cardinality of the set

$S = \left\{\frac{p}{q} \mid p, q \in N^*, p, q \le 10\right\}$ is

JNU-2019

(a) 55 (b) 57 (c) 60 (d) 60

65. In a relational model, a relation is considered as a

JNU-2019

(a) Table (b) Tuple
(c) Attribute (d) Row

66. A fair coin is tossed successively four times. What is the probability exactly three heads?

JNU-2019

(a) 1/4 (b) 3/4 (c) 7/8 (d) 1

67. A critical section must have the number of processes to avoid the race condition

JNU-2019

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

68. What is the maximum value of the integral $\int_a^b \left(9 - x^2\right) dx$ over all possible real numbers a, b satisfying the condition a ≤ b?

JNU-2019

(a) 3 (b) 6 (c) 36 (d) 54

69. The indefinite integral $\int x\, 2^x dx$ equals

JNU-2019

(a) $(x - 1)2^x / \ln(2)$
(b) $(x \ln(2) - 1)2^x / \ln(2)^2$
(c) $\ln(2)$
(d) $(x \ln(2) - 1)\, 2^x / \ln(2)$

70. The equation of plane passing through the points (2, 3, - 4) and (1, -1, 3) and parallel to x –axis is

JNU-2019

(a) 7y + 4z = 5 (b) 2y + z = 11
(c) y – 2x = - 7 (d) 4y + 2x = 2

71. The value of $\lim_{n\to\infty} \frac{\tan x}{x}$ is

JNU-2019

(a) 1 (b) 0 (c) -1 (d) does not exist

72. The vector A and B are perpendicular if

JNU-2019

(a) A.B = 1 (b) A.B = 0
(c) A × B =1 (d) A × B =0

73. The non-linear data structure is

JNU-2019

(a) stack (b) array
(c) strings (d) trees

74. The eigen value of $\begin{pmatrix} 5 & 1 \\ -1 & 3 \end{pmatrix}$ are

JNU-2019

(a) 4, 4 (b) 5, 3 (c) 1, -1 (d) 4, -4

75. The value for '?' is

25	10	15
36	12	24
49	?	42

JNU-2019

(a) 14 (b) 22 (c) 7 (d) 18

76. Let $y\sqrt{x^2 + a^2} = \log\left(\sqrt{x^2 + a^2} - x\right)$ for some constant a. Then the derivatives $\frac{dy}{dx}$ is

JNU-2019

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

77. Inter process communication on (IPC) is needed

JNU-2019

(a) to execute a process
(b) to execute all processes
(c) to communicate to different processes
(d) to allow process to synchronize an activity

78. The dot product of vectors (2, - 5, 1) and (-4, 1, 7) is

JNU-2019

(a) 7 (b) 5 (c) -6 (d) -8

79. The centroid of the triangle A(0, 3), B(4, 0), C(5, 3) is

JNU-2019

(a) $\left(\frac{9}{2}, 3\right)$ (b) (3, 2)
(c) (4, 5) (d) (3, 4)

80. The point that divides the line segment of the points (5, - 2, 1) and (3, 5, -5) in the ratio 1 : 3 externally is

JNU-2019

(a) $\left(3, -5, -\frac{1}{2}\right)$ (b) $\left(\frac{9}{2}, -\frac{1}{2}, -\frac{1}{2}\right)$
(c) (6,-5, 4) (d) $\left(6, -\frac{1}{2}, 4\right)$

81. There are 100 students in a class out which 70 study Mathematics, 80 English. How many students do study both Mathematics and English?

JNU-2019

(a) 20 (b) 30 (c) 40 (d) 50

82. If $f(x) = \frac{1}{1 - x}$, then f(f(f(x))) is

JNU-2019

(a) $1/(1 - x)^2$ (b) $((x - 1)^2$
(c) x (d) x^3

83. The 9's complement of 325800 is

JNU-2019

(a) 674199 (b) 773299
(c) 684389 (d) 696789

84. Let $f(x) = ax^2 + bx + c$ be a polynomial that takes both positive and negative values ax x varies over all real n umbers. What is the relation satisfied by the coefficients?

JNU-2019

(a) $c < \left(\frac{b}{2}\right)^2$ (b) $ac < \left(\frac{b}{2}\right)^2$
(c) $c > \left(\frac{b}{a}\right)^2$ (d) $bc > (2a)^2$

85. The value of the integral $\int_0^\infty x^{n-1} e^{-x} dx, n$ is a positive integer, is

JNU-2019

(a) n! (b) $\frac{e}{n!}$ (c) e^{-1} (d) e^{-2}

86. Consider the statement,
"Either – 2 ≤ x ≤ - 1 or 1 ≤ x ≤ 2"

JNU-2019

(a) x < - 2 or 2 < x or – 1 < x < 1
(b) x < - 2 or 2 < x
(c) – 2 < x < 2
(d) x ≤ - 2 or 2 ≤ x or – 1 < x < 1

87. Thrashing is sometime necessary, but it does not execute a given process. It can be avoided

JNU-2019

(a) by keeping pages of the working set of the programs in main memory
(b) increasing the CPU speed
(c) increasing I/O processor speed
(d) all of them

88. Which function is not uniformly continuous on (0, 1)?

JNU-2019

(a) x^2 (b) $1/x^2$ (c) sin x (d) $\frac{\sin x}{x}$

89. The most relevant word to knowledge is

JNU-2019

(a) School (b) Book
(c) Teacher (d) Learning

90. Let [x] denotes the greatest integer function of x. What is the value of the integral $\int_{1/2}^{1}\left[2x^2+x\right]dx$?

JNU-2019

(a) $\frac{23}{24}$ (b) $\left(7-\sqrt{17}\right)/4$
(c) $\left(-1+\sqrt{17}\right)/4$ (d) $\left(7+\sqrt{17}\right)/4$

91. A student gets a Bachelor Degree only after passing all the written test papers and submitting the assignments. Out of 200 students, 150 passed all their written papers and 160 submitted their assignments. How many students did get their Bachelor Degree?

JNU-2019

(a) at least 110 (b) Exactly 160
(c) At least 140 (d) At least 150

92. A list in which the pointer points to a next node is called

JNU-2019

(a) single linked list
(b) double linked list
(c) circular linked list
(d) Array of pointers

93. Hammer is to Ironsmith. Pen is to ….

JNU-2019

(a) Author (b) Writer
(c) Student (d) Teacher

94. The value of integral $\int_0^{\pi/2}\log\sin x dx$ is

JNU-2019

(a) $\log_e 2$ (b) $\frac{\pi}{n!}$

(c) $\frac{\pi}{2}\log_e 2$ (d) $\log_e \pi$

95. Parity bit helps in

JNU-2019

(a) Finding error of multiple bits
(b) Correcting error of multiple bits
(c) Both
(d) None of these

96. An Eigen vector corresponding to the Eigen value λ = 8 for matrix $A=\begin{pmatrix}7 & 3\\ 2 & 2\end{pmatrix}$ is

JNU-2019

(a) $\begin{pmatrix}3\\1\end{pmatrix}$ (b) $\begin{pmatrix}3\\-1\end{pmatrix}$
(c) $\begin{pmatrix}-1\\2\end{pmatrix}$ (d) $\begin{pmatrix}1\\2\end{pmatrix}$

97. The value of integral $\int_0^{\infty}\frac{\sin ax}{x}dx, a>0,$ is

JNU-2019

(a) $\frac{\pi}{2}$ (b) π (c) $\log_e 2$ (d) $\log_e \pi$

98. The next term of the series id 6, 5, 24, 25, 144, ….

JNU-2019

(a) 160 (b) 165 (c) 170 (d) 175

99. Consider the function f(x) = 3x – 7. The f^2 is given by

JNU-2019

(a) $9x - 28$ (b) $9x^2 - 42x + 49$
(c) $6x - 14$ (d) $9x^2 - 49$

100. The eccentricity of ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

JNU-2019

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

Answers

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

1. **Ans. ()**

2. **Ans. ()**

3. **Ans. ()**

4. **Ans. ()**

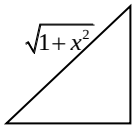
$$\sum\frac{1}{n^2}=\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+\ldots\ldots$$

5. **Ans. ()**

6. **Ans. ()**

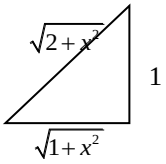
7. **Ans. (a)**

$\cos\left(\tan^{-1}\left(\sin\left(\cot^{-1}x\right)\right)\right)$



$= \cos\left(\tan^{-1}\left(\frac{\sin^{-1}}{\sqrt{1+x^2}}\right)\right)$

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



$= \sqrt{\frac{1+x^2}{2+x^2}}$

8. **Ans. (a)**
$\begin{vmatrix}1 & 5 & 3\\ 1 & 10 & 6\\ 1 & 15 & 9\end{vmatrix} = 0$ as C_2, C_3 are multiple of each other

9. **Ans. (c)**

10. **Ans. (a)**

11. **Ans. (b)**
On 30th day baby eat one banana
On 31st day = 3/a banana
On 32nd day = 9/4 = 2.25 banana
On 33rd day = 27/8 banana < 5
On 34rd day = 81/16 banana > 5
So 34 day is the right answer

12. **Ans. (d)**
(a, b) R (x, y) iff ay = bx
Ref. (a, b) R (a, b) = ab = b a
Symm. If (a, b) R (c, d) $\Rightarrow$ ad = bc $\Rightarrow$ (c, d) R (a, b)
as cb = ad $\Rightarrow$ ad = bc is satisfied
$\Rightarrow$(a, b) R (c, d) $\Rightarrow$ ad = bc, (c, d) R (e, g)
$\Rightarrow$ multiply both adcf = bcde $\Rightarrow$ af = be cf = de

13. **Ans. ()**

14. **Ans. (d)**

15. **Ans. (c)**
$\begin{vmatrix}1 & 1 & 1\\ 1 & 2 & 3\\ 1 & 1 & 4\end{vmatrix}$
= 1(8 – 3) – 1 (4 – 3) + (1 – 2)
= 5 – 1 – 1 = 3 $\Rightarrow$ |A| $\neq$ 0 $\Rightarrow$ A is invertible

16. **Ans. ()**

17. **Ans. ()**

18. **Ans. (b)**
P(T) = .5, P(C) = .7
P((T $\cup$ C)c) = 1 – P (T $\cup$ C) = .1
$\Rightarrow$ P(T $\cup$ C) = . 9
$\Rightarrow$ P(T) + P(C) – P(T $\cap$ C) = . 9
.5 + .7 – P(T $\cap$C) = .9
$\Rightarrow$ P (T $\cap$ C) = .3

19. **Ans. (b)**
$\angle R^+, >$ is a group as all properties of group are satisfied.

20. **Ans. (c)**
$\alpha + \beta = \frac{7}{2}, \alpha\beta = 2$
$\Rightarrow (\alpha - \beta) = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta} = \sqrt{\frac{49}{4} - 8} = \frac{\sqrt{17}}{2}$

21. **Ans. ()**

22. **Ans. (b)**
$= {}^{10}C_2 . {}^{7}C_1 = \frac{\lfloor 10}{\lfloor 2 \lfloor 8} . \frac{\lfloor 7}{\lfloor 1 \lfloor 6}$
$= \frac{10.9}{2}.7 = 3.5$

23. **Ans. (c)**
$\Rightarrow \sum S_n = \sum \frac{1}{n}$ converges to L $\Rightarrow$ not true
$\sum S_n^2 = \sum \frac{1}{n^2}$ converges

24. **Ans. ()**

25. **Ans. ()**

26. **Ans. ()**

27. **Ans. (c)**

28. **Ans. (b)**
$xy = \sqrt{x^2 + y^2}$
$x^2y^2 = x^2 + y^2$
$2xy^2 + 2x^2 y\frac{dy}{dx} = 2x + 2y\frac{dy}{dx}$
$xy^2 - x = \left(y - x^2 y\right)\frac{dy}{dx}$
$\frac{dy}{dx} = \frac{x\left(y^2 - 1\right)}{y\left(1 - x^2\right)}$

29. **Ans. ()**

30. **Ans. (a)**
$3^{x+y+z} = 81 = 3^4$
$\Rightarrow$ x + y + z = 4
$\Rightarrow (x + y + z)^2 = 16$
$x^2 + y^2 + z^2 + 2xy + 2yx + 2zx = 16$

31. **Ans. (a)**
$(-1)^{\frac{1}{3}} = -1, -w, -w^2$

$= -1, \frac{1+\sqrt{3}i}{2}, \frac{1-\sqrt{3}i}{2}$

$\frac{1+\sqrt{3}i}{2} = \cos\frac{\pi}{3} + i\sin\frac{\pi}{3}$

32. **Ans. ()**

33. **Ans. (b)** Let A = i, B = j
$\Rightarrow$ a(2A – 7B) + 2aB – 2(2A – bB) = 0
a(2i – 7j) + 2aj – 2(2i – bj) = 0
(2a – 4)i + (-5a + 2b)j = 0
$\Rightarrow$ 2a – 4 = 0, - 5a + 2b = 0
$\Rightarrow$ a = 2, b = 5

34. **Ans. (c)**

35. **Ans. (d)**
As identity element is (0, 0)

36. **Ans. (a)**
TTH + TTTH _ _____

$P = \left(\frac{1}{2}\right)^3 + \left(\frac{1}{2}\right)^4 + \_\_\_$

$= \frac{\left(\frac{1}{2}\right)^3}{1-\frac{1}{2}} = \frac{\frac{1}{8}}{\frac{1}{2}} = \frac{1}{4}$

37. **Ans. ()**

38. **Ans. ()**

$\begin{pmatrix} 1 & 2 & 7 \\ 1 & 7 & 9 \\ 1 & 2 & 7 \end{pmatrix}(x) = \begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$

$x\begin{pmatrix} 1 & 2 & 7 \\ 1 & 7 & 9 \\ 1 & 2 & 7 \end{pmatrix}^{-1}\begin{pmatrix} 1 \\ 2 \\ 1 \end{pmatrix}$

Now $\begin{vmatrix} 1 & 2 & 7 \\ 1 & 7 & 9 \\ 1 & 2 & 7 \end{vmatrix}$

(49 – 18) - 1(0) + 1(18 – 49) = 0
$\Rightarrow$No solution.
41(b) $(a, b)^{-1} = (b > a)^{-1} = a^{-1}$ o b^{-1}

39. **Ans. ()**

40. **Ans. (c)**
P lay is related to ground in the same way swimming is related to pool.

41. **Ans. (b)**
$(a_0b)^{-1} = (b_0a)^{-1} = a^{-1}{}_0b^{-1}$

42. **Ans. (b)**
$x^2 + x + 1 \overline{)x^4 + x^2 + x + 1(}\ x^2 - x + 1$
$x^4 + x^3 + x^2$
$-x^3 + x + 1$
$-x^3 - x^2 - x$
$x^2 + 2x + 1$
$x^2 + x + 1$
x

43. **Ans. (a)** $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = 2\tan^{-1}x$

44. **Ans. (d)**
Every other measurement other then kiloliter belongs to same group (for measurement of length)

45. **Ans. ()**

46. **Ans. (b)**
$\sin^{-1}x + \sin^{-1}\sqrt{1-x^2}$

$= \sin^{-1}x + \cos^{-1} = \frac{\pi}{2}$

47. **Ans. (d)**
As Banana is a Fruit, which use all sell in a Market
Similarly, Novel is a Book, which sell in Book store.

48. **Ans. (c)**
$a_0b = a + b - 3$
$a_0e = a \Rightarrow a + e - 3 = a$
$\Rightarrow$ e = 3

49. **Ans. ()**

50. **Ans. ()**

51. **Ans. (c)**
$\frac{3 \text{ cow} \times 8 \text{ days}}{1 \text{ ground}} = \frac{? \text{ cows} \times 2 \text{ days}}{1 \text{ ground}}$

$\Rightarrow$ No. of cows $= \frac{3\times 8}{2} = 12$ cows.

52. **Ans. (d)**

- 2	1	0	– 19	– 30
	↓	-2	4	30
	1	– 2	– 15	0

$(x^3 - 19x - 30) = (x + 2)(x^2 - 2x - 15)$
$= (x + 2)(x - 5)(x + 3)$
$\Rightarrow$ Roots are -2, 5, - 3

53. **Ans. ()**

54. **Ans. (a)**
0 + 1 + 1 = 2
1 + 1 + 2 = 4
1 + 2 + 4 = 7
2 + 4 + 7 = 13
So, 4 + 7 + 13 = 24

55. **Ans. ()**

56. **Ans. (d)**
One-third distance = 100 km
One-fifth of remaining = 40 km
Rest = 160 km

Average speed $= \dfrac{Totaldis\tan ce}{Totaltime} = \dfrac{300}{\dfrac{100}{100}+2+\dfrac{160}{8}}$

$= \dfrac{300}{1+2+2} = 60$ km/hr

57. **Ans. (a)** Slope of line joining (1, 4), (4, 0)

$= \dfrac{4}{-3} = -\dfrac{4}{3}$

$\Rightarrow$ Equation of line $y-4 = -\dfrac{4}{3}(x-1)$

$3y - 12 = -4x + 4$

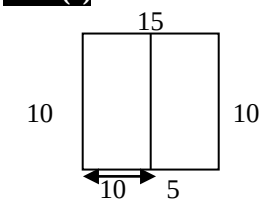
$4x + 3y - 16 = 0$

$\Rightarrow \perp$ distance of (5, 2) is $= \left|\dfrac{20+6-16}{\sqrt{4^3+3^2}}\right| = \dfrac{10}{5} = 2$

58. **Ans. ()**

59. **Ans. ()**

60. **Ans. (c)**



61. **Ans. ()**

62. **Ans. (d)**

$\vec{a} = (4, -3, 2)$

$\left|\vec{a}\right| = \sqrt{4^2+3^2+2^2} = \sqrt{29}$

63. **Ans. (d)**

Excluding care, all other options are the parts of a car.

64. **Ans. (b)**

$x = \dfrac{p}{q}$

If p = 1, q = 1, 2, …….. 10 $\Rightarrow$ 10 nos.

p = 2 $\Rightarrow$ q = 1, 3, 5, 7, 9 $\Rightarrow$ 5 nos.

p = 3 $\Rightarrow$ q = 1, 2, 4, 5, 7, 8, 10 $\rightarrow$ 7

p = 4 $\Rightarrow$ q = 1, 3, 5, 7, 9 $\rightarrow$ 5

p = 5 $\Rightarrow$ q = 1, 2, 3, 4, 6, 7, 8, 9 $\rightarrow$ 8

p = 6 $\Rightarrow$ q = 1, 5, 7,

p = 7 $\Rightarrow$ q = 1, 2, 3, 4, 5, 6, 8, 9 $\rightarrow$ 8

p = 8 $\Rightarrow$ q = 1, 3, 5, 7, 9 $\rightarrow$ 5

p = 9 $\Rightarrow$ q = 1, 2, 4, 5, 7, 8 $\rightarrow$ 6

$\Rightarrow$ Total = 57

65. **Ans. ()**

66. **Ans. (a)**

${}^4C_3\left(\dfrac{1}{2}\right)^4 = 4.\dfrac{1}{16} = \dfrac{1}{4}$

67. **Ans. ()**

68. **Ans. (d)**

$\int_a^b \left(9-x^2\right)dx \le \int_a^b 9dx = 9(b-a) \le 54$

From choices

69. **Ans. (b)**

$\int x2^x dx$

$= x.\dfrac{2^x}{\log 2} - \int 1.\dfrac{2^x}{\log 2}dx$

$= \dfrac{x2^x}{\log 2} - \dfrac{2^x}{(\log 2)^2} + c$

$= \dfrac{(x\log 2 - 1)2^x}{(\log 2)^2}$

70. **Ans. ()**

71. **Ans. (b)**

$\lim_{x\to\infty} \dfrac{\tan x}{x} = \lim_{x\to\infty} \dfrac{1}{x}\tan x = 0$

72. **Ans. (b)**

73. **Ans. ()**

From choices only (a) satisfies

74. **Ans. (a)**

$A = \begin{pmatrix} 5 & 1 \\ -1 & 3 \end{pmatrix}$

$|A - \lambda I| = \begin{vmatrix} 5-\lambda & 1 \\ -1 & 3-\lambda \end{vmatrix} = 0$

$\Rightarrow (5 - \lambda)(3 - \lambda) + 1 = 0$

$\lambda^2 - 8\lambda + 16 = 0$

$\Rightarrow (\lambda - 4)^2 \Rightarrow \lambda = 4, 4$

75. **Ans. (c)**

25 = 10 + 15

36 = 12 + 24

49 = ? + 42

So ? = 7

76. **Ans. (a)**

$g\sqrt{x^2+a^2} = \log\left(\sqrt{x^2+a^2} - x\right)$

$\dfrac{dy}{dx}\sqrt{x^2+a^2} + \dfrac{y}{2\sqrt{x^2+a^2}}.2x$

$= \dfrac{1}{\left(\sqrt{x^2+a^2}-x\right)} \times \left(\dfrac{2x}{2\sqrt{x^2+a^2}} - 1\right)$

$\dfrac{dy}{dx}\sqrt{x^2+a^2} + \dfrac{xy}{\sqrt{x^2+a^2}} = \dfrac{-1}{\sqrt{x^2+a^2}}$

$\dfrac{dy}{dx}\left(x^2+a^2\right) + xy = -1$

$\Rightarrow \dfrac{dy}{dx} = \dfrac{xy+1}{x^2+a^2}$

77. **Ans. ()**

78. **Ans. (c)**
$\vec{a}.\vec{b} = 2(-4)+(-5)(1)+1.7$
= - 8 – 5 + 7 = - 6

79. **Ans. (b)**
Control
$=\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$
$=\left(\frac{9}{3}, \frac{6}{3}\right)=(3,2)$

80. **Ans. (d)**
$(x,y,z)=\left(\frac{1.3-3.5}{1-3}, \frac{1.5-3(-2)}{1-3}, \frac{1.(-5)-3(1)}{1-3}\right)$
$=\left(6, \frac{-11}{2}, 4\right)$

81. **Ans. (d)**
$n(M \cap E) = n(M) + n(E) – n(M \cup E)$
= 70 + 80 – 100 = 50

82. **Ans. (c)**
$f=\frac{1}{1-x} \Rightarrow f(g(x))=\frac{1}{1-\frac{1}{1-x}}=\frac{1-x}{-x}=\frac{x-1}{x}$
$f(f(f(x)))=\frac{1}{1-\left(\frac{x-1}{x}\right)}=\frac{x}{1}=x$

83. **Ans. ()**

84. **Ans. (b)**
$f(x) = ax^2 + bx + c$ as takes +ve, -ve values $\Rightarrow$ has real roots
$\Rightarrow D > 0 \Rightarrow b^2 – 4ac > 0 \Rightarrow ac < \left(\frac{b}{2}\right)^2$

85. **Ans. ()**

86. **Ans. ()**
None

87. **Ans. ()**

88. **Ans. (b)**
At x = 0 $\Rightarrow \lim_{x\to 0}\frac{1}{x^2} = ONE$

89. **Ans. ()**
Knowledge = learning (Most relevant)

90. **Ans. (b)**
$\int_{\frac{1}{2}}^{1}\left[2x^2+x\right]dx$
As $\frac{1}{2} \le x \le 1$
$\frac{1}{4} \le x^2 \le 1$
$\frac{1}{2} \le 2x^2 \le 2$
$\Rightarrow \frac{1}{2}+\frac{1}{2} \le 2x^2+x \le 1+2$
$1 \le 2x^2+x \le 3$
$\Rightarrow \int_{\frac{1}{2}}^{1}\left[2x^2+x\right] = \int_{\frac{1}{2}}^{\frac{-1+\sqrt{17}}{4}} 1dx + \int_{\frac{-1+\sqrt{17}}{4}}^{1} 2dx$
$=\left[x\right]_{\frac{1}{2}}^{\frac{-1+\sqrt{17}}{4}}+\left[2x\right]_{\frac{-1+\sqrt{17}}{4}}^{1}$
$=\left(\frac{-1+\sqrt{17}}{4}-\frac{1}{2}\right)+2\left(1-\left(\frac{-1+\sqrt{17}}{4}\right)\right)$
$=\frac{3}{2}-\left(\frac{-1+\sqrt{17}}{4}\right)=\frac{7-\sqrt{17}}{4}$

91. **Ans. (a)** n(W) = 150
n(A) = 160
$\Rightarrow n(W \cap A) \ge 150 + 160 – 200 = 110$

92. **Ans. ()**

93. **Ans. (b)**
Hammer is to Iron smith.
Similarly Pen is the Writer.

94. **Ans. ()**
$I=\int_0^{\frac{\pi}{2}}\log\sin x dx = \int_0^{\frac{\pi}{2}}\log\sin\left(\frac{\pi}{2}-x\right)dx$
$=\int_0^{\frac{\pi}{2}}\log\cos x dx$
$\Rightarrow I+I=\int_0^{\frac{\pi}{2}}\log\sin x\cos x dx$
$2I=\int_0^{\frac{\pi}{2}}\log\sin 2x dx-\int_0^{\frac{\pi}{2}}\log 2 dx$
$=\int_0^{\frac{\pi}{2}}$

95. **Ans. ()**

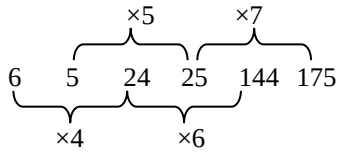
96. **Ans. (a)**
$A=\begin{pmatrix}7 & 3\\ 2 & 2\end{pmatrix}$
Eigen vector corresponding to λ = 8 is X s.t.
= (A – 8I) x = 0
$\begin{pmatrix}-1 & 3\\ 2 & -6\end{pmatrix}\begin{pmatrix}x\\ y\end{pmatrix}=\begin{pmatrix}0\\ 0\end{pmatrix}$

$$\Rightarrow \begin{pmatrix} -1 & 3 \\ 0 & 0 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \Rightarrow -x + 3y = 0 \Rightarrow x = 3y$$

$$\Rightarrow \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3y \\ y \end{pmatrix} = y\begin{pmatrix} 3 \\ 1 \end{pmatrix}$$

97. **Ans. ()**

98. **Ans. (d)**



99. **Ans. (b)**

$f = 3x - 7 \Rightarrow f^2 = (3x - 3)^2 = 9x^2 - 42x + 49$

100. **Ans. (c)**

$$\Rightarrow e^2 = \frac{a^2 - b^2}{a^2} \Rightarrow e = \sqrt{1 - \frac{b^2}{a^2}}$$