

PU (CHD)-ACTUAL PAPER-2022

1. In the series 7, 10, 8, 11, 9, 12, ... What number should come next?
(a) 10 (b) 11 (c) 12 (d) 13
2. Following are some words translated from an artificial language.
gordoflur means fan belt
pixngordo means ceiling fan
arthtusl means tile roof
Which word could mean "ceiling tile"?
(a) flurgordo (b) gordotusl
(c) pixnarth (d) arthflur
3. Find the statement that must be true according to the given information:
Pooja is twelve years old. For three years, she has been asking her parents for a dog.
Her parents have told her that they believe a dog would not be happy in an apartment, but they have given her permission to have a bird. Pooja has not yet decided what kind of bird she would like to have.
(a) Pooja's parents like birds better than they like dogs.
(b) Pooja and her parents live in an apartment.
(c) Pooja does not like birds.
(d) Pooja and her parents would like to move.
4. I am facing East. Turning to the right I go 20 m, then turning to the left I go 20 m and turning to the right I go 20 m, then again turning to the right I go 40 m and then again I go 40 m to the right. In which direction am I from my original position?
(a) North (b) East (c) South (d) West
5. If 'X \$ Y' means 'X is father of Y'; 'X # Y' means 'X is mother of Y'; 'X × Y' means 'X is sister of Y', then how is D related to N in N # A \$ B × D ?
(a) Nephew (b) Grandson
(c) Granddaughter (d) Cannot be determined
6. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?
(a) Monday (b) Wednesday
(c) Friday (d) Sunday
7. In how many ways can the letters of the word 'LEADER' be arranged?
(a) 72 (b) 720 (c) 180 (d) 360
8. A room is 15 m long and 12 m broad. If the sum of the areas of the floor and the ceiling is equal to the sum of the areas of four walls, the volume of the room is:
(a) 1200 (b) 600 (c) 900 (d) 1800
9. How many times are the hands of a clock at right angle in a day?
(a) 24 (b) 44 (c) 22 (d) 42
10. The price of 10 bottles is equal to that of 4 glasses. The price of 15 bottles and 2 glasses together is Rs. 4000. The total price of 12 bottles and 3 glasses is:
(a) 3500 (b) 3900 (c) 4200 (d) 4500
11. What is the synonym of 'Thrift'?
(a) Wickedness (b) Economy
(c) Elegant (d) Misery
12. The given sentence has been split into four segments. Identify the segment that has grammatical error.
Had you / not reached in time, / we will have / lost our lives.
(a) had you (b) not reached in time
(c) we will have (d) lost our lives
13. What is the antonym of 'Imperil'?
(a) Safeguard (b) Hazard
(c) Endanger (d) Jeopardise
14. Choose the correct meaning of the idiom used in the given sentence.
The sight of the accident made me flash creep.
(a) frightened me (b) worried me
(c) confused me (d) drew my attention
15. Choose the correct sentence
(a) My sister had left for America last week
(b) My sister has been left for America last week
(c) My sister left for America last week
(d) My sister has left America last week
16. Select the most suitable alternative to make the sentence meaningful.
Even a _____ glance will reveal the mystery.
(a) crude (b) cursory
(c) critical (d) curious
17. Select the pair which has same relationship as Pain : sedative.
(a) Comfort : Stimulant (b) Trance : Narcotic
(c) Grief : Consolation (d) Ache : Extraction
18. The cloth merchant has purchased two _____ of cloth.
(a) bails (b) bales
(c) bials (d) bailes
19. A person who is indifferent of pleasure or pain is
(a) Parasite (b) Usurer
(c) Stoic (d) Pessimist
20. Which of the following modifies or describes noun in a sentence?
(a) Adverb (b) Conjunction
(c) Preposition (d) Adjective
21. Let $f(x) = \frac{x-1}{x+1}$, then $f(f(x))$ is
(a) $\frac{1}{x}$ (b) $-\frac{1}{x}$ (c) $\frac{1}{x+1}$ (d) $\frac{1}{x-1}$
22. The binary operation * defined on N by $a * b = a + b + ab$ for all $a, b \in N$ is
(a) Commutative only
(b) Associative only
(c) Both commutative and associative
(d) Neither commutative nor associative
23. If f is an invertible function defined as $f(x) = \frac{3x-4}{5}$, then $f^{-1}(x)$ is
(a) $5x + 3$ (b) $5x + 4$
(c) $\frac{5x+4}{3}$ (d) $\frac{3x+5}{4}$
24. The function $f(x) = \log(x^2 + \sqrt{x^2 + 1})$ is
(a) Even function (b) Odd function
(c) Both even and odd (d) Neither even nor odd
25. What type of relation is 'less than' in the set of real numbers?
(a) Only symmetric (b) Only transitive
(c) Only reflexive (d) Equivalence

26. The maximum value of $z = 3x + 4y$ subjected to constraints $x + y \leq 4$, $x \geq 0$ and $y \geq 0$ is:
 (a) 12 (b) 14 (c) 16 (d) 21
27. The point which does not lie in the half plane $4x + 3y - 12 < 0$ is
 (a) (2, 1) (b) (1, 2) (c) (-2, 3) (d) (2, 3)
28. In Linear Programming Problem (LPP), the linear inequalities or restrictions on the variables are called
 (a) Inequalities (b) Linear constraints
 (c) Constraints (d) Limits
29. The optimal value of the objective function is attained at the points
 (a) given by intersection of inequation with y-axis only
 (b) given by intersection of inequation with x-axis only
 (c) given by corner points of the feasible region
 (d) given by non-corner points of the feasible region
30. Objective function of a linear programming problem is **PU-2022**
 (a) a constraint
 (b) function to be optimized
 (c) a relation between the variables
 (d) a relation between the constraints
31. If $P(A \cap B)$ is 70% and $P(B) = 85\%$, then $P(A|B)$ is equal to **PU-2022**
 (a) 14/17 (b) 17/20 (c) 14/20 (d) 17/25
32. Three balls are drawn from a bag containing 2 blue and 5 black balls. If the random variable x represents the number of blue balls drawn, then x can take values **PU-2022**
 (a) 0, 1, 2 (b) 0
 (c) 0, 1 (d) 0, 1, 2, 3
33. Two dice are thrown. If it is known that the sum of numbers on the dice was less than 6, the probability of getting a sum 3 is
 (a) 1/18 (b) 1/9 (c) 1/5 (d) 2/5
34. If two events are independent, then
 (a) They must be mutually exclusive
 (b) Sum of their probabilities must be equal to 1
 (c) Both A and B are correct
 (d) Occurrence of one event does not affect the chances of the occurrence of the other event
35. If A and B are two event such that $P(A) \neq 0$ and $P(B|A) = 1$, then
 (a) $A \subset B$ (b) $B \subset A$ (c) $B = \phi$ (d) $A = \phi$
36. Find x , if $\begin{pmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{pmatrix}$ is singular.
 (a) 1 (b) 2 (c) 3 (d) 4
37. If $A = \begin{pmatrix} 2 & -3 \\ 3 & 4 \end{pmatrix}$, find A^{-1}
 (a) $\frac{1}{17} \begin{pmatrix} 2 & 3 \\ -3 & 4 \end{pmatrix}$ (b) $\frac{1}{17} \begin{pmatrix} 4 & 3 \\ -3 & 2 \end{pmatrix}$
 (c) $-\frac{1}{17} \begin{pmatrix} 4 & 3 \\ -3 & 2 \end{pmatrix}$ (d) $\frac{1}{17} \begin{pmatrix} 4 & -3 \\ 3 & -2 \end{pmatrix}$
38. If for non-singular matrix A, $A^2 = I$, find A^{-1}
 (a) A (b) I (c) 0 (d) Either A or B
39. If A is a square matrix of order 2×2 , then $|KA|$ is equal to _____
 (a) $K|A|$ (b) $K^2|A|$ (c) $K^3|A|$ (d) $2^K|A|$
40. If $\begin{vmatrix} 2x+5 & 3 \\ 5x+2 & 9 \end{vmatrix} = 0$, then x is _____.
 (a) 13 (b) -13 (c) 12 (d) -12
41. The function $f(x) = e^{|x|}$ is _____.
 (a) Continuous and differentiable everywhere
 (b) Not continuous at $x = 0$
 (c) Continuous everywhere but not differentiable at $x = 0$
 (d) Differentiable at $x = 0$
42. If volume of a sphere is increasing at a constant rate, the rate at which its radius is increasing is _____.
 (a) constant
 (b) proportional to the radius
 (c) inversely proportional to the radius
 (d) inversely proportional to the surface area
43. If $\frac{d}{dx}(f(x))$ is $g(x)$, then antiderivative of $g(x)$ is
 (a) $f(x)$ (b) $f'(x)$ (c) $g'(x)$ (d) $g(x)$
44. The area of the region bounded by the circle $x^2 + y^2 = 1$ is _____.
 (a) 2π sq. units (b) π sq. units
 (c) 3π sq. units (d) 4π sq. units
45. The radius of a circle is increasing at the rate of 0.4 cm/s. The rate of increasing of its circumference is:
 (a) 0.4π cm/s (b) 0.8 cm/s
 (c) 0.8π cm/s (d) 0.4 cm/s
46. If R is a relation on set N of natural numbers as R is defined by $m R n$ if m divides n , then R is
 (a) Reflexive (b) Symmetric
 (c) Transitive (d) Both A and B
47. Which of the following is correct about determinant?
 (a) It is a square matrix
 (b) It is a number associated with square matrix
 (c) It is a number associated with column matrix
 (d) It is a number associated with any type of matrix
48. A dice is thrown and a card is selected at random from a deck of 52 playing cards. The probability of getting an odd number on the dice and a club card is
 (a) $1/2$ (b) $1/4$ (c) $1/8$ (d) $1/12$
49. The product of two number are 12 and their LCM is 6. What is the HCF of these numbers?
 (a) 72 (b) 2 (c) 6 (d) 12
50. The $(n - 1)^{\text{th}}$ term of an A.P. is given by 7, 12, 17, 22, ... is
 (a) $5n + 2$ (b) $5n + 3$
 (c) $5n - 2$ (d) $5n - 3$
51. In a square of side 10 cm, its diagonal is
 (a) 10 cm (b) 12 cm
 (c) $10\sqrt{2}$ cm (d) $12\sqrt{2}$ cm
52. The distance between the point P(1, 4) and Q(4, 0) is _____.
 (a) 4 (b) 5 (c) 6 (d) 10
53. The algebraic sum of the deviations of a frequency distribution from its mean is always _____.
 (a) Greater than zero (b) Less than zero
 (c) Zero (d) Non - zero
54. The mode and mean are given as 7 and 8, respectively. Then the median is _____.
 (a) 1/13 (b) 1/23 (c) 3/23 (d) 23/3
55. The angle of depression of a truck, standing on the ground, from the top of a 75 m high tower, is 30° .

- The distance of the truck from the base of the tower is _____.
- (a) $25\sqrt{3}$ m (b) $75\sqrt{3}$ m
(c) $50\sqrt{3}$ m (d) $100\sqrt{3}$ m
56. Two cubes each with 6 cm edge are joined end to end. The surface area of the resulting cuboid is ____.
- (a) 36 cm^2 (b) 360 cm^2
(c) 720 cm^2 (d) 520 cm^2
57. 100 pages are numbered from 1 to 100. What is the probability of getting a prime number?
- (a) $\frac{3}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{2}{3}$
58. In a competitive examination, one mark is awarded for each correct answer while 0.5 mark is deducted for every wrong answer. Meena answered 120 questions and got 90 marks. How many questions did she answer correctly?
- (a) 95 (b) 98 (c) 100 (d) 102
59. What is XLII in Arabic Numerals?
- (a) 42 (b) 62 (c) 72 (d) 92
60. Find the equation of plane passing through the points P(1, 1, 1), Q(3, -1, 2), R(-3, 5, -4).
- (a) $x + 2y = 0$ (b) $x - y = 2$
(c) $-x + y = 2$ (d) $x + y = 2$
61. Which Protocol is used for browsing data?
- (a) FTP (b) HTTP (c) TCP (d) SMTP
62. Which language offers the ability to query data, insert and delete tuples?
- (a) Data Definition Language (DDL)
(b) Data Manipulation Language (DML)
(c) Data Control Language (DCL)
(d) Transaction Control Language (TCL)
63. What is the purpose of the following statement in C language?
`int *p[10];`
- (a) p is an array of 10 pointers to integers.
(b) p is a pointer to an array of 10 integers.
(c) p is a pointer to an array of 10 pointers to integers.
(d) p is an array of 10 integers.
64. Which of the following allows several objects in a class hierarchy to have different methods with same name
- (a) Inheritance (b) Aggregation
(c) Encapsulation (d) Polymorphism
65. What is the location of a parent node for any arbitrary node i in a heap?
- (a) $i/2$ (b) $i+1$
(c) $\text{floor}(i/2)$ (d) $\text{ceil}(i/2)$
66. ROM stores _____
- (a) Operating System (b) Kernel
(c) Bootstrap Loader (d) Compiler
67. In a timesharing Operating System, when the time slot assigned to a process is completed, the process switches to which state?
- (a) Ready state (b) Suspended state
(c) Terminated state (d) Blocked state
68. Regression testing is related to _____.
- (a) Functional Testing (b) Structural Testing
(c) Data Flow Testing (d) Maintenance Testing
69. An if-else statement can be replaced with _____ operator.
- (a) Logical (b) Conditional
(c) Relational (d) Arithmetic
70. Full form of FAT is _____.
- (a) File Attribute Table (b) File Allocation Table
(c) First Allocation Table (d) Fit Allocation Table
71. _____ command is used to display the documentation of commands in Unix.
- (a) man (b) help
(c) search (d) what
72. In Boolean Algebra, $(B.B') + B = ?$
- (a) B' (b) B (c) 0 (d) 1
73. Numerical techniques are commonly _____ in nature.
- (a) Direct (b) Iterative
(c) Reductive (d) Eliminative
74. _____ is a universal gate.
- (a) XOR (b) AND
(c) NAND (d) OR
75. In Big Data, velocity refers to _____.
- (a) Data arriving at fast speed
(b) Noise in data
(c) Large amount of data
(d) Diverse data

PU -2022 ANSWER KEY

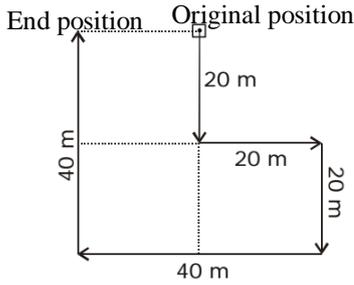
1	2	3	4	5	6	7	8	9	10
a	c	b	d	d	c	d	a	b	b
11	12	13	14	15	16	17	18	19	20
b	c	a	a	c	b	c	b	c	d
21	22	23	24	25	26	27	28	29	30
b	c	c	a	b	c	d	c	c	b
31	32	33	34	35	36	37	38	39	40
a	a	c	d	a	d	b	a	b	b
41	42	43	44	45	46	47	48	49	50
c	d	a	b	c	ac	b	none	b	d
51	52	53	54	55	56	57	58	59	60
c	b	c	d	b	b	c	c	a	d
61	62	63	64	65	66	67	68	69	70
b	b	b	d	c	c	a	a	b	b
71	72	73	74	75					
a	b	b	c	a					

PU-ACTUAL PAPER 2022 SOLUTIONS

1. **Ans. (a)** This is a simple alternating addition and subtraction series.
In the first pattern, 3 is added;
In the second pattern, 2 is subtracted.
Rule = (1st number) (1st number + 3 = 2nd number)
(2nd number - 2 = 3rd number) (3rd number + 3 = 4th number)
Now (7) (7 + 3 = 10) (10 - 2 = 8) (8 + 3 = 11) (11 - 2 = 9) (9 + 3 = 12) (12 - 2 = 10)...
So the answer is b = 10.
2. **Ans. (c)** Gorbl means fan; flur means belt; pixn means ceiling; arth means tile; and tustl means roof. Therefore, **pixnarth** is the correct choice.
3. **Ans. (b)** Since Pooja parents think a dog would not be happy in an apartment, we can reasonably conclude that the family lives in an apartment. We do not know if Pooja's parents dislike dogs (choice

a) or if Pooja dislikes birds (choice b). There is no support for choice d.

4. **Ans. (d)** It is clear from the diagram that, now I am to the west with respect to the original position.



5. **Ans. (d)**

N⁻
|
A+
|
B⁻ — D

From diagram we can see that D's gender is not decided so we can't determine the relation of D with B.

6. **Ans. (c)** Given,
It was Sunday on January 1st, 2006
So, 31st December 2005 is Saturday
Number of odd days from 2006 to 2009 = 1 + 1 + 2 + 1 = 5
31st December 2009 is Thursday.
So, 1st January, 2010 is Friday.
Hence, "Friday" is the correct answer.

7. **Ans. (d)** Given: The word is 'LEADER'.
Calculation:
The number of letters in LEADER = 6
The number of times letter E is present = 2
The total number of ways = 6!/2!
The total number of ways = $6 \times 5 \times 4 \times 3 \times 2 \times 1/2 \times 1 = 360$
∴ The total number of ways is 360.

8. **Ans. (a)** Step-1: Solve for height of hall
Given: length (l) = 15m, breadth (b) = 12 m
Let the height be 'h'
According to the equation
sum of the areas of the floor and the ceiling is equal to the sum of the areas of the four walls
area of floor = $l \times b$
area of ceiling = $l \times b$
area of wall = $2(l + b)h$
so, the equation will become
 $l \times b + l \times b = 2(l + b)h \Rightarrow lb = lh + bh$
 $\Rightarrow 15(12) = 15(h) + 12(h)$
 $\Rightarrow 180 = 27h \Rightarrow h = \frac{20}{3}$
Step-2: Solve for the volume of the height
Volume of hall = $l \times b \times h$
 $= 15 \times 12 \times \frac{20}{3} = 1200$
Hence, the volume of hall = 1200 m^3 .

9. **Ans. (b)** In 12 hours, they are at right angles 22 times.

⇒ In 24 hours, they are at right angles 44 times.

10. **Ans. (b)** Given $10B = 4G \Rightarrow B = \frac{2}{5}G \dots(1)$

$$\text{Also } 15B + 2G = 4000 \Rightarrow 15 \times \frac{2}{5}G + 2G = 4000$$

$$6G + 2G = 4000 \Rightarrow G = 500$$

Put value of G in equation (1)

$$\Rightarrow B = \frac{2}{5} \times 500 = 200$$

$$\text{Now } 12B + 34 = 12 \times 200 + 3 \times 500 = 2400 + 1500 = 3900$$

11. **Ans. (b)** 12. **Ans. (c)** 13. **Ans. (a)**

14. **Ans. (a)** 15. **Ans. (c)** 16. **Ans. (b)**

17. **Ans. (c)** 18. **Ans. (b)** 19. **Ans. (c)**

20. **Ans. (d)**

21. **Ans. (b)** $f(x) = \frac{x-1}{x+1}$

$$f(f(x)) = f\left(\frac{x-1}{x+1}\right) = \frac{\frac{x-1}{x+1} - 1}{\frac{x-1}{x+1} + 1} = \frac{x-1-x-1}{x-1+x+1} = \frac{1}{x}$$

22. **Ans. (c)** $a * b = a + b + ab$ for all $a, b \in \mathbb{N}$

Associative:- $a, b, c \in \mathbb{N}$
 $(a * b) * c = (a + b + ab) * c$
 $= a + b + ab + c + c(a + b + ab)$
 $= a + ab + b + c + ac + bc + abc$
 $a * (b * c) = a * (b + c + bc)$
 $= a + (b + c + bc) + a(b + c + bc)$
 $= a + b + c + bc + ab + ac + abc$

Commutative: $a, b \in \mathbb{N}$
 $a * b = a + b + ab$
 $b * a = b + a + ba$
 $a * b = b * a \Rightarrow$ commutative
 Both commutative and associative

23. **Ans. (c)** $f(x) = \frac{3x-4}{5} = y \Rightarrow 3x - 4 = 5y$

$$3x = 5y + 4 \Rightarrow 3x = 5y + 4$$

$$x = \frac{5y+4}{3} \Rightarrow y = \frac{5x+4}{3} \text{ is the inverse}$$

24. **Ans. (a)** $f(x) = \log(x^2 + \sqrt{x^2 + 1})$

$$f(-x) = \log((-x)^2 + \sqrt{(-x)^2 + 1})$$

$$= \log(x^2 + \sqrt{1+x^2}) \Rightarrow f(-x) = f(x)$$

Even function.

25. **Ans. (b)** "Less than" in the set of real numbers

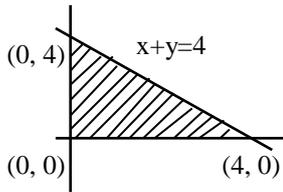
Reflexive :- $a < a$ 'Not possible' for $a \in \mathbb{R} \Rightarrow$ Not Reflexive

Symmetric :- $a < b$ for $a, b \in \mathbb{R}$ example $2 < 3$ but $3 \not< 2$ i.e. $b \not< a$; $a, b \in \mathbb{R} \Rightarrow$ Not symmetric.

Transitive :- $a < b$ for $a, b \in \mathbb{R}$ and $b < c$ for $b, c \in \mathbb{R}$

$\therefore a < c$ for $a, c \in \mathbb{R}$

26. **Ans. (c)** Maximum value of $z = 3x + 4y$ s.t. constraints
 $x + y \leq 4$, $x \geq 0$ and $y \geq 0$ is
 optimal value occurs at boundary points



At $(0, 0)$, $z = 0$
 At $(4, 0)$, $z = 3(4) + 4(0) = 12$
 At $(0, 4)$, $z = 3(0) + 4(4) = 16$
 Max value = 16

27. **Ans. (d)** $4x + 3y < 12$
 i.e., point which doesn't satisfy this relation.
 $(2, 1) \Rightarrow 4(2) + 3(1) = 11 < 12$
 $(1, 2) \Rightarrow 4(1) + 3(2) = 4 + 6 = 10 < 12$
 $(-2, 3) \Rightarrow 4(-2) + 3(3) = 9 - 8 = 1 < 12$
 $(2, 3) \Rightarrow 4(2) + 3(3) = 8 + 9 = 17 \not< 12$

28. **Ans. (c)** In Lpp, linear inequalities or restrictions on the variables are called constraints

29. **Ans. (c)**
 Optimal values of objective function is attained at the points; given by corner points of the feasible region.

30. **Ans. (b)** Objective function of a LPP is a function to be optimized

31. **Ans. (a)** $P(A \cap B) = 70\% = \frac{70}{100}$

$$P(B) = 85\% = \frac{85}{100}$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{\frac{70}{100}}{\frac{85}{100}} = \frac{70}{85} = \frac{14}{17}$$

32. **Ans. (a)** No doubt from 2 blue balls we can draw 0, 1, 2 blue balls.

33. **Ans. (c)** If two dice are thrown
 $E_1 =$ sum is less than 6 = $\{(1, 1), (1, 2), (2, 1), (1, 3), (3, 1), (1, 4), (4, 1), (2, 3), (3, 2), (2, 2)\}$
 $\Rightarrow n(E_1) = 10$
 Now $E_2 =$ Sum is 3 = $\{(1, 2), (2, 1)\}$
 $\Rightarrow P(E_2 / E_1) = \frac{2}{10} = \frac{1}{5}$

34. **Ans. (d)** By definition

35. **Ans. (a)** Here $P(A) \neq 0$
 $P\left(\frac{B}{A}\right) = 1 = \frac{P(A \cap B)}{P(A)} = 1 \Rightarrow A \subset B$ as $A \cap B = A$

36. **Ans. (d)** $\begin{bmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{bmatrix}$ is singular
 $0 = \begin{vmatrix} 1 & 2 & x \\ 1 & 1 & 1 \\ 2 & 1 & -1 \end{vmatrix} = 1[-1-1] - 2[-1-2] + x[-1] = 0$
 $= -2 - 2(-3) - x = 0 = -2 + 6 = x \Rightarrow x = 4$

37. **Ans. (b)** $A = \begin{bmatrix} 2 & -3 \\ 3 & 4 \end{bmatrix}$. Here $|A| = 8 + 9 = 17$
 $A^{-1} = \frac{1}{17} \begin{bmatrix} 4 & 3 \\ -3 & 2 \end{bmatrix}$

38. **Ans. (a)** $|A| \neq 0$, $A^2 = I$ then multiply by A^{-1}
 $(A^2)A^{-1} = I.A^{-1} \Rightarrow A = A^{-1}$

39. **Ans. (b)** A is square matrix of order 2×2 , $|KA| = K^n$
 $|A| = K^2|A|$

40. **Ans. (b)** $\begin{vmatrix} 2x+5 & 3 \\ 5x+2 & 9 \end{vmatrix} = 0$
 $\Rightarrow 9(2x+5) - 3(5x+2) = 0$
 $\Rightarrow 18x + 45 - 15x - 6 = 0 \Rightarrow 3x + 39 = 0$
 $\Rightarrow 3x = -39 \Rightarrow x = -13$

41. **Ans. (c)** $f(x) = e^{|x|} \Rightarrow f(x) = \begin{cases} e^x & ; x \geq 0 \\ e^{-x} & ; x < 0 \end{cases}$
 At $x = 0$; $\lim_{x \rightarrow 0^+} e^x = 1$ and $\lim_{x \rightarrow 0^-} e^{-x} = 1$
 \therefore function is continuous at $x = 0$
 Let hand derivative

$$f'(0^-) = \lim_{h \rightarrow 0} \frac{f(0-h) - f(0)}{-h}$$

$$= \lim_{h \rightarrow 0} \frac{f(-h) - f(0)}{-h} = \lim_{h \rightarrow 0} \frac{e^h - 1}{-h} = \lim_{h \rightarrow 0} \frac{e^h}{-1} = -1$$

$$f'(0^+) = \lim_{h \rightarrow 0} \frac{f(0+h) - f(0)}{h} = \lim_{h \rightarrow 0} \frac{e^h - 1}{h}$$

$$= \lim_{h \rightarrow 0} \frac{e^h}{1} = 1$$

Therefore $f'(0^-) \neq f'(0^+)$

$\therefore f$ is not differentiable at $x = 0$

- \therefore continuous everywhere but not differentiable at $x = 0$

42. **Ans. (d)** Volume of sphere = $\frac{4}{3}\pi r^3 = v$

$$\frac{dv}{dt} = \frac{4}{3}\pi 3r^2 \frac{dr}{dt} = c, \text{ c is constant}$$

$$\frac{dr}{dt} = \frac{3c}{4\pi 3r^2} = \frac{c}{4\pi r^2}$$

$\frac{dr}{dt}$ is inversely proportional to the area

43. **Ans. (a)** $\frac{d}{dx}(f(x)) = g(x) \Rightarrow g(x) = f'(x)$

\therefore antiderivative of $g(x)$

i.e. $\int g(x) = \int f'(x) = f(x)$

44. **Ans. (b)** Area of the region bounded by the circle $x^2 + y^2 = 1$ is π sq. unit.

45. **Ans. (c)** Radius of a circle is increasing at the rate of 0.4 cm/s

$$\therefore \frac{dr}{dt} = 0.4 \text{ cm/s}$$

Circumference of a circle is $2\pi r$

Rate of increasing of its circumference .

Let $c = 2\pi r$

$$\frac{dc}{dt} = 2\pi \frac{dr}{dt} = 2\pi(0.4) = 0.8\pi \text{ cm/s}$$

46. **Ans. (a, c)** If R is relation on set N of natural numbers as R is defined by mRn if m divides n, then R is

Reflexive:- for $m \in N$

m/m always $\therefore mRm \Rightarrow$ Reflexive

Transitive: for $m, n, t \in N$

If $m | n$ & $n | t$ then

$$n = m \cdot x, x \in N \text{ and } t = ny, y \in N \quad \dots(2)$$

$$t = mxy \Rightarrow m | t$$

so transitive relation

Symmetric:- 2/4 but 4 does not divide 2

\therefore Relation R is not symmetric

47. **Ans. (b)** Determinant is the number associated with square matrix.

48. **Ans. (none)** Here $P(\text{odd no. on dice}) = \frac{3}{6}$

$$P(\text{getting a club cards}) = \frac{4}{52} = \frac{1}{13}$$

$$\text{So required probability} = \frac{3}{6} \cdot \frac{1}{13} = \frac{1}{26}$$

49. **Ans. (b)** As $(L.C.M) \times (H.C.F) = \text{Product of two nos.}$

Here product of nos. = 12

$$L.C.M. = 6 \Rightarrow H.C.F = \frac{12}{6} = 2$$

50. **Ans. (d)** A.P. is 7, 12, 17, 22,

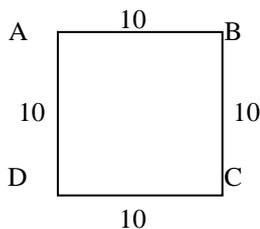
$a = 7, d = 5$

$$T_{n-1} = a + (n-1)d$$

$$= a + (n-2)d = 7 + (n-2)5$$

$$= 7 + 5n - 10 = 5n - 3$$

51. **Ans. (c)** In a square ABCD



$$AB = 10 \text{ cm}, \quad BC = 10 \text{ cm}$$

$$AC = \sqrt{(10)^2 + (10)^2}$$

$$= \sqrt{100+100} = \sqrt{200} = \sqrt{100 \times 2}$$

$$AC = 10\sqrt{2} \text{ cm}$$

52. **Ans. (b)** P(1, 4) and Q(4, 0) is

$$PQ = \sqrt{(4-1)^2 + (0-4)^2} = \sqrt{3^2 + 4^2} \\ = \sqrt{9+16} = \sqrt{25} = 5$$

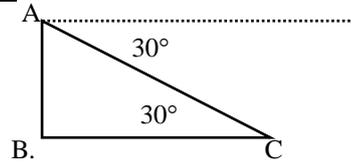
53. **Ans. (c)** As $\frac{1}{n} \sum (x_i - \bar{x}) = 0$

54. **Ans. (d)** As $M_0 = 3 \text{ Median} - 2 \text{ Mean}$
Here mode = 7, Mean = 8

$$\Rightarrow 7 = 3 \text{ Median} - 2 \cdot 8$$

$$3 \text{ median} = 23 \Rightarrow \text{Median} = \frac{23}{3}$$

55. **Ans. (b)**



We have to find BC

$$AB = 75 \text{ m so } \tan 30^\circ = \frac{AB}{BC}$$

$$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{AB}{BC} \Rightarrow BC = AB\sqrt{3} = 75\sqrt{3} \text{ m}$$

56. **Ans. (b)** As two cubes of length 6 are joined so we have cube of length $l = 6$, Height $h = 6$, breadth $b = 12$

$$\text{Surface area of cuboid} = 2(lb + bh + lh) = 2(36 + 72 + 72) = 360$$

57. **Ans. (c)** As there are 25-prime no. from 1 to 100
There are 2, 3, 5, 7,, 97.

$$\Rightarrow \text{probability of prime} = \frac{25}{100} = \frac{1}{4}$$

58. **Ans. (c)** Let she answers correctly x questions.

So she answers wrongly $120-x$ questions.

So by given condition

$$\Rightarrow 1.x - (.5)(120 - x) = 90$$

$$x - \frac{1}{2}(120 - x) = 90 \Rightarrow \frac{3x}{2} = 150 \Rightarrow x = 100$$

59. **Ans. (a)**

60. **Ans. (d)** Equation of plane passing through points.

P(1, 1, 1), Q(3, -1, 2), R(-3, 5, -4)

By options

These points are satisfied only by $x + y = 2$

61. **Ans. (b)** 62. **Ans. (b)** 63. **Ans. (b)**

64. **Ans. (d)** 65. **Ans. (c)** 66. **Ans. (c)**

67. **Ans. (a)** 68. **Ans. (b)** 69. **Ans. (b)**

70. **Ans. (b)** 71. **Ans. (a)** 72. **Ans. (b)**

73. **Ans. (b)** 74. **Ans. (c)** 75. **Ans. (a)**