PU CHD ACTUAL PAPER-2021

1. A book fell ___ the shelf.
   (a) from (b) of (c) off (d) in
2. The negative of the sentence "He has a bath every day" is
   (a) He doesn't has a bath every day
   (b) He doesn't have a bath every day
   (c) He doesn't had a bath every day
   (d) He didn't have a bath every day
3. Some people talk _____ their work all the time.
   (a) of (b) about
   (c) on (d) onto
4. Keya is very different _____her sister.
   (a) to (b) of
   (c) from (d) with
5. I saw Linda at the station when I was going to work this morning, but she _____me.
   (a) didn't see (b) hasn't seen
   (c) doesn't see (d) hadn't seen
6. Choose the best alternative for the following.
   _____ a party next Sunday. I hope you can come.
   (a) we have (b) we will have
   (c) we will be having (d) we are having
7. Choose the word that is spelled wrongly.
   (a) accomodation (b) faithful
   (c) pragmatic (d) fridge
8. What is the synonym of INTRIGUE?
   (a) sincere (b) peaceful
   (c) confuse (d) deceptive
9. What is the antonym of BREACH?
   (a) cancel (b) adherence
   (c) trespass (d) ignore
10. Lakshmi has a melodious tone. The parts of speech of MELODIOUS is
    (a) adverb (b) adjective
    (c) proposition (d) conjunction
11. Find the odd word from the following.
    (a) running (b) walking
    (c) driving (d) diving
12. The number which is different from others is
    (a) 6325 (b) 7621 (c) 5436 (d) 2716
13. If 'CAD' is coded as 'XZW', how 'FAB' is coded?
    (a) WXV (b) WXE (c) UZY (d) UYZ
14. In a row of children, Karan is 5th from left end and 18th from right end. How many children are there in the row?
    (a) 22 (b) 23 (c) 18 (d) 21
15. Which one of the following sets is like the set (48, 24, 12)?
    (a) (44, 22, 10) (b) (40, 20, 10)
    (c) (46, 22, 11) (d) (42, 20, 10)
16. Choose the number similar to the numbers in the set (363, 489, 579).
    (a) 382 (b) 562 (c) 281 (d) 471
17. Which one of the following group of letters is different from the rest?
    (a) Tuesday (b) Saturday
    (c) Monday (d) Thursday
18. Ranvir left home and cycled 10 km southwards, turned right and cycled 5 km and turned right and cycled 10 km and turned left and cycled 10 km. How many kilometers will he have to cycle to reach his home straight?
    (a) 10 (b) 15 (c) 20 (d) 25
19. A man is facing south. He turns 135° in the anticlockwise direction and then 180° in the clockwise direction. Which direction is he facing now?
    (a) North-east (b) North-west
    (c) South-east (d) South-west
20. A and B are brothers. C and D are sisters. A's son is D's brother. How is B related to C?
    (a) Uncle (b) Father
    (c) Brother (d) Grandfather
21. Which of the following is a program that runs continuously in a computing device?
    (a) Compiler (b) Operating system
    (c) Power on self test (d) Loader
22. In which of the following computing, accessing and managing hardware, software and applications is possible from anywhere as and when required?
    (a) Parallel (b) Distributed
    (c) Centralized (d) Cloud
23. The full form of HTTPS is
    (a) Hyper text transfer protocol system
    (b) Hyper text translation processing system
    (c) Hyper text transfer protocol secure
    (d) Hyper text transfer processing system
24. An operating system that allows the processing of a job till its completion is known as
    (a) Non-Preemptive (b) Timesharing
    (c) Preemptive (d) Multitasking
25. The Binary equivalent of the decimal number 22.8125 is
    (a) 10110.1101 (b) 1010.1011
    (c) 10011.1100 (d) 10110.1111
26. Which of the following cannot be an Octal number?
    (a) 1111 (b) 2345 (c) 1000 (d) 8762
27. Best, average and worst case complexity of merge sort algorithm to sort n numbers is
    (a) n*n*n (b) n*log n (c) n*n (d) log n
28. The purpose of "lp" command in Unix is to
    (a) list files and directories
    (b) format file for printing
    (c) take hard copy of the file
    (d) list current running processes
29. Who among the following invented world wide web (www)?
    (a) Robert Cailliau (b) Jimmy Wales
    (c) Tim Berners -Lee (d) Ada Lovelace
30. Which one of the following UNIX network commands is used to test the network connection?
    (a) netstat (b) ping
    (c) telnet (d) finger
31. What is the output of the following code?

```
main()
{ char * str1 = "abcd";
char * str2[] = "abcd";.
printf ("%d %d %d", sizeof (str1), sizeof (str2),
sizeof ("abcd"));
}
```

    (a) 2 5 5 (b) 2 4 4 (c) 2 4 5 (d) 8 5 5

32. How many times " Thank You" is printed based on the following code?

```
int main()
{
int a = 0;
while (a++ < 5 - ++a)
printf (" Thank You");
return (0);
}
```

(a) 5 times (b) 4 times
(c) 1 time (d) 2 times

33. Which one among the following operators can not be overloaded?
(a) sizeof (b) *
(c) ++ (d) =

34. Multilevel inheritance involves
(a) A class is derived from a single base class
(b) A class is derived from more than one base class
(c) A class is derived from a class which in turn is derived from another class
(d) If number of classes are derived from a single base class

35. What is the output of the following C code?

```
int main ( )
{
int a = printf (" COMPUTER");
printf (" %d", a);
return( 0);
}
```

(a) Compilation error (b) COMPUTER
(c) 0 (d) COMPUTER8

36. If the second term of a geometric progression is 5, then the product of first three terms is
(a) 25 (b) 125 (c) 625 (d) 3125

37. The number of relations on set A containing n elements is
(a) 2^{2n} (b) $2n^2$ (c) 2n (d) n^2

38. Suppose a natural number a is said to be related another natural number b if $|a-b| \leq 4$. The relation is
(a) Reflexive and transitive
(b) Transitive and symmetric
(c) Reflexive and symmetric
(d) Reflexive, transitive and symmetric

39. Which of the following set of vectors is linearly independent?
(a) ({ ((1, 0),(1,1)} (b) {(1,1), (1, 1)}
(c) {(1 2), (-1,-2)} (d) {(1,-1), (-1,1)

40. The smallest positive integral value of n for which $\left(\frac{1+i}{1-i}\right)^n = 1$ is
(a) 8 (b) 4 (c) 16 (d) 10

41. There are seven candidates and maximum four are to be chosen by voters. Thus a voter may choose minimum one and maximum four candidates. The number of ways in which a person can vote is
(a) 95 (b) 96 (c) 97 (d) 98

42. A question paper is divided into two sections A and B. Each section contains 5 questions. The number of ways in which a candidate can answer 6 questions selecting at least two questions from each section is
(a) 50 (b) 200 (c) 150 (d) 100

43. The expression $n^3 + 3n^2 + 5n + 3$ (n is a natural number) is divisible by
(a) 3 (b) 2 (c) 4 (d) 5

44. The sum of the series
$1 / [(2/3!) + (4/5!) + (6/7!)+\dots]$ is
(a) 1/e (b) e (c) $1/e^2$ (d) e^2

45. Value of $1+ \log y + [(\log y)]^2 /2! + [(\log y)]^3 /3! +....$ is
(a) log y (b) y (c) –log y (d) 2 log y

46. The value of k for which the matrix $\begin{bmatrix} 2 & k \\ 3 & 5 \end{bmatrix}$ has no inverse is
(a) -10/3 (b) 3/10 (c) -3/10 (d) 10/3

47. If $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & m & -1 \end{bmatrix}$ then A^2 equals to
(a) A (b) -A (c) Unit matrix (d) Null matrix

48. The eigen values of the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ are
(a) (2, 2, 6) (b) (2, 2, 8)
(c) (3, 3, 6) (d) (3, 3, 8)

49. If $\sin^2\theta = (x^2 + y^2) / (2 x y)$, Which of the following is true?
(a) x = y (b) x<y (c) x>y (d) x = 2xy

50. If $\sin x + \sin^2 x = 1$, then the value of $\cos^2 x + \cos^4 x$ =?
(a) 2 (b) 1 (c) -1 (d) 1/2

51. The value of sin15° is
(a) $2\sqrt{3}$ (b) $2 + \sqrt{3}$
(c) $(\sqrt{3} - 1) / 2\sqrt{2}$ (d) $(\sqrt{3} + 1) / 2\sqrt{2}$

52. If sin A = sin B and cos A = cos B, then which of the following is true?
(A) sin (A+B) = 0 (B) cos (A+B) = 0
(C) cos (A-B) = 0 (D) sin (A-B) = 0

53. The greatest value of sinx cosx is
(a) 2 (b) 1 (c) 1/2 (d) -1

54. Then number of terms in the expansion of $(A+B+C)^n$ where n is a positive integer is
(a) n (n+1)/2 (b) (n+1) (n+2)/2
(c) (n+1) (n+3)/2 (d) n (n-1)/2

55. If the three vertices of a rectangle taken in order are the points (2, -2), (8, 4), (5, 7), then the coordinates of the fourth vertex are
(a) (1, 1) (b) (1, -1) (c) (-1, 1) (d) (-1, -1)

56. The term independent of x in the expansion of $[(3/2)x^2 - 1/(3x)]^9$ is
(a) 7/18 (b) 5/18 (c) 11/18 (d) 13/18

57. The coordinates of the middle points of the sides of a triangle are (4, 2), (3, 3) and (2, 2) then the coordinates of the centroid are
(a) (3, 7/3) (b) (3, 3)
(c) (4, 3) (d) (3, 4)

58. The coordinates of the focus of the parabola $y^2 = 8 x$ are
(a) (2, 0) (b) (-2, 0) (c) (0, 2) (d) (0, -2)

59. The distance between the lines 3x + 4y = 9 and 6x + 8y = 15 is
(a) 3/2 (b) 3/10 (c) 6 (d) 8

60. The centre of the circle passing through the points (0,0), (1,1) and (-1,1) is
(a) (1, 0) (b) (0,1) (c) (1,-1) (d) (-1,-1)

61. The equation of a diameter of the circle $x^2 + y^2 – 6x +2y = 0$ is

(a) x-3y=0 (b) x+3y=0
(c) 3x-y=0 (d) -3x+y=0

62. $\lim_{x\to 0} [\sqrt{(1+x)} - \sqrt{(1-x)}] / x =$
(a) 1 (b) -2 (c) 3 (d) 2

63. The derivative of the function $\sin^{-1} [2x/(1+x^2)]$ at x = 1 is
(a) 2 (b) -1 (c) 0 (d) 1

64. If $f(x) = x^n$, then $f^n(x) =$
(a) n^n (b) n! (c) x^2 (d) x

65. All the points on the curve $y^2 = x + \sin(x)$ at which the tangent is parallel to the x axis lie on a
(a) Circle (b) Straight line
(c) Parabola (d) Ellipse

66. The value of the integral $\int | 1 - x | dx = 0$
(a) 0 (b) 1 (c) 2 (d) 3

67. $\int (\cos\sqrt{x}) / \sqrt{x}\, dx =$
(a) cos x + c (b) sin x + c
(c) $2\sin\sqrt{x} + c$ (d) $\sin \sqrt{x} + c$

68. The area common to the curves $x = -2y^2$, $x = 1-3y^2$ is
(a) 1/3 (b) 2/3 (c) 1 (d) 4/3

69. The equation of the curve whose slope is given by 2y/x and which passes through the point (1,1) is
(a) $2x^2+y^2 =3$ (b) $x^2-y^2=0$
(c) $y = x^2$ (d) $2x^2-y^2 = 3$

70. Which of the following is a measure of the central tendency?
(a) Mode (b) Mean Deviation
(c) Standard Deviation (d) Coefficient of Correlation

71. The mean of 200 items was 50. Later, it was found that two items were misread as 92 and 8 instead of 192 and 88. What is the correct mean?
(a) 50.5 (b) 50.9 (c) 51 (d) 60

72. When the correlation between two variables is perfect, the value of coefficient of correlation is
(a) -1 (b) 1 (c) 0 (d) ±1

73. An urn contains 8 white balls and 4 red balls, out of which two balls are drawn at random. Find the probability that both balls are red.
(a) 1/12 (b) 2/11 (c) 1/11 (d) 2/12

74. Two dice are tossed. The probability that the total score is a prime number is
(a) 1/6 (b) 5/12 (c) 1/2 (d) 5/36

75. The relation a+ib < c+id is meaningful only if
(a) a=0,b=0 (b) c=0,d=0
(c) a=0,c=0 (d) b=0,d=0

PU CHD-2021 ANSWERS

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

PU CHD-2021 (SOLUTIONS)

1. **Ans. (c)**

2. **Ans. (b)**

3. **Ans. (b)**

4. **Ans. (c)**

5. **Ans. (a)**

6. **Ans. (d)**

7. **Ans. (a)**

8. **Ans. (d)**

9. **Ans. (b)**

10. **Ans. (b)**

11. **Ans. (c)** **Swimming**, **Sailing** and **Diving** are related with water. So, Driving is odd one.

12. **Ans. (c)**
6325 → 6 + 3 + 2 + 5 → 16
7621 → 7 + 6 + 2 + 1 → 16
5436 → 5 + 4 + 3 + 6 → 18
2716 → 2 + 7 + 1 + 6 → 16
Hence, (c) is the correct option.

13. **Ans. (c)**

C	A	D		F	A	B
↓	↓	↓	⇒	↓	↓	↓
X	Z	W		U	Z	Y

A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N

14. **Ans. (a)**
$\vec{5}$
k ∴ Total children = 18 + 5 – 1 = **22**
$\overleftarrow{18}$

15. **Ans. (b)**
48, 24, 12 ⇒ Similarly **40, 20, 10**
(× 2, × 2) (× 2, × 2)

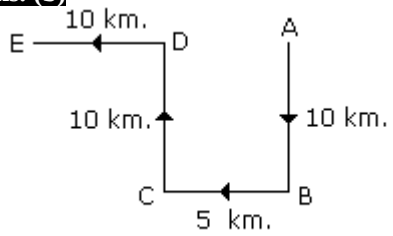
16. **Ans. (d)** 363, 489, 579
All numbers are divisible by 3.
So, only 471 is divisible by 3.

17. **Ans. (c)**

	Tuesday	Saturday	**Monday**	Thursday
Code →	2	6	**1**	4

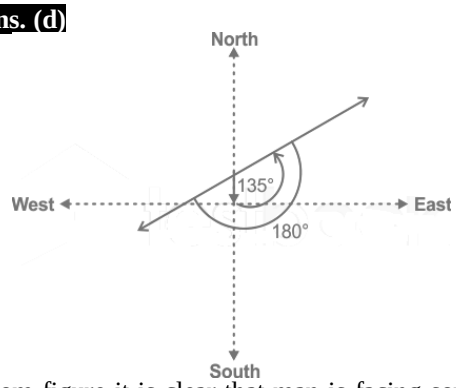
So, except the code of the Monday all other days have even number code.

18. **Ans. (b)**



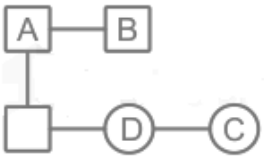
So from figure can see that Ranvir will have to cycle 15 km to reach his home.

19. **Ans. (d)**



From figure it is clear that man is facing south west direction.

20. **Ans. (a)**



Clearly B is uncle of C.

36. **Ans. (b)** $T_2 = ar = 5$
Product of first three terms
$P = a.ar \,.\, ar^2 .= a^3r^3 = (ar)^3 = 5^3 = 125$

37. **Ans. (b)** If $n(A) = n \Rightarrow$ No. of relations on $A = 2^{n^2}$

38. **Ans. (c)** If $a, b \in N$ and $|a - b| \le 4$
1. **Ref:-** Reflexive $|a - a| \le 4 \Rightarrow 0 \le 4 \Rightarrow$ Reflexive
2. **Symmetric:** If $|a - b| \le 4 \Rightarrow |b - a| \le 4 \Rightarrow$ symmetric
3. **Transitive :-** If $|a - b| \le 4$, $|b - c| \le 4$
Take $a = 1, b = 5, c = 9$
Here $|a - b| \le 4, |b - c| \le 4 \Rightarrow |a - c| \not\le 4$

39. **Ans. (a)** L.I., $\Rightarrow \begin{vmatrix} 1 & 0 \\ 1 & 1 \end{vmatrix} = 1 \neq 0 \left[(1,0),(1,1)\right]$ are L.I.

40. **Ans. (b)** Here $\left(\frac{1+i}{1-i}\right)^n = \left(\frac{1+i}{1-i} \times \frac{1+i}{1+i}\right)^n$

$$= \left(\frac{(1+i)^2}{1+1}\right)^n = \left(\frac{1+i^2+2i}{2}\right)^n = \left(\frac{1-1+2i}{2}\right)^n = i^n$$

Then least +ve integer $n = 4$ such that $i^n = 1$

41. **Ans. (d)** Here total candidates $n = 7$.
$\Rightarrow {}^7C_1 + {}^7C_2 + {}^7C_3 + {}^7C_4$
$= 7 + 21 + 35 + 35 = 98$

42. **Ans. (b)** As sections A, B contains 5 questions each.
So no. of ways of selecting alteast two questions from each section and he has to select 6 – questions from sections A and B
So total ways $A \to 2, B \to 4 \to {}^5C_2 \,.\, {}^5C_4$
$A \to 3, B \to 3 \to {}^5C_3 \,.\, {}^5C_3$
$A \to 4, B \to 2 \to {}^5C_4 \,.\, {}^5C_2$
So total ways
$= {}^5C_2 \,.\, {}^5C_4 + {}^5C_3 \,.\, {}^5C_3 + {}^5C_4 \,.\, {}^5C_2$
$= 10.5 + 10.10 + 5.10 = 50 + 100 + 50 = 200$

43. **Ans. (a)** By taking $n = 2$
Then $n^3 + 3n^2 + 5n + 3 = 8 + 12 + 10 + 3 = 33$
is divisible by 3

44. **Ans. (b)** $\dfrac{1}{\left[\dfrac{2}{\lfloor 3} + \dfrac{4}{\lfloor 5} + \dfrac{6}{\lfloor 7} + \ldots\right]}$

$$\frac{1}{\sum_{n=1}^{\infty} \frac{2n}{\lfloor 2n+1}} = \frac{1}{\sum_{n=1}^{\infty} \frac{2n+1-1}{\lfloor 2n+1}} = \frac{1}{\sum_{n=1}^{\infty} \left[\frac{2n+1}{\lfloor 2n+1} - \frac{1}{\lfloor 2n+1}\right]}$$

$$= \frac{1}{\sum_{n=1}^{\infty} \left[\frac{1}{\lfloor 2n} - \frac{1}{\lfloor 2n+1}\right]} = \frac{1}{\sum_{n=1}^{\infty} \frac{1}{\lfloor 2n} - \sum_{n=1}^{\infty} \frac{1}{\lfloor 2n+1}}$$

$$= \frac{1}{\left(\frac{1}{\lfloor 2} + \frac{1}{\lfloor 4} + \frac{1}{\lfloor 6} + \ldots\right) - \left(\frac{1}{\lfloor 3} + \frac{1}{\lfloor 5} + \frac{1}{\lfloor 7} + \ldots\right)}$$

$$= \frac{1}{\left(\frac{1}{\lfloor 2} - \frac{1}{\lfloor 3} + \frac{1}{\lfloor 4} - \frac{1}{\lfloor 5} + \frac{1}{\lfloor 6} - \frac{1}{\lfloor 7} + \ldots\right)} = \frac{1}{e^{-1}} = e$$

As $e^{-1} = 1 - 1 + \frac{1}{\lfloor 2} - \frac{1}{\lfloor 3} + \frac{1}{\lfloor 4} \ldots\ldots$

45. **Ans. (b)** $1 + \log y + \dfrac{(\log y)^2}{\lfloor 2} + \dfrac{(\log y)^3}{\lfloor 3} + \ldots\ldots$
$= e^{\log y} = y$

46. **Ans. (d)** As $\begin{bmatrix} 2 & k \\ 3 & 5 \end{bmatrix}$ has no inverse

$$\Rightarrow \begin{vmatrix} 2 & k \\ 3 & 5 \end{vmatrix} = 0 \Rightarrow 10 - 3k = 0 \Rightarrow k = \frac{10}{3}$$

47. **Ans. (c)** $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & m & -1 \end{bmatrix}$

$$A^2 = A.A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & m & -1 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & m & -1 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = I$$

48. **Ans. (b)** Let $A=\begin{bmatrix}6 & -2 & 2\\ -2 & 3 & -1\\ 2 & -1 & 3\end{bmatrix}$

$|A-\lambda I|=\begin{vmatrix}6-\lambda & -2 & 2\\ -2 & 3-\lambda & -1\\ 2 & -1 & 3-\lambda\end{vmatrix}$

$(6-\lambda)((3-\lambda)^2-1)+2(-6+2\lambda+2)+2(2-6+2\lambda)=0$

$(6-\lambda)(\lambda^2-6\lambda+8)+4(2\lambda-4)=0$

$(6-\lambda)(\lambda-2)(\lambda-4)+8(\lambda-2)=0$

$(\lambda-2)(-\lambda^2+10\lambda-16)=0 \Rightarrow (\lambda-2)^2(\lambda-8)=0$

$\Rightarrow \lambda = 2, 2, 8.$

49. **Ans. (a)** $\sin^2\theta=\dfrac{x^2+y^2}{2xy}$

As $0\le\sin^2\theta\le 1 \Rightarrow 0\le\dfrac{x^2+y^2}{2xy}\le 1$

$\Rightarrow x^2+y^2\le 2xy \Rightarrow (x-y)^2\le 0 \Rightarrow x=y$

as $(x-y)^2 \not< 0$ but if $x=y=0$

Then $\sin^2\theta=\dfrac{x^2+y^2}{2xy}$

Does not exist as 0/0 form

So $x=y\neq 0$

50. **Ans. (b)** $\sin x+\sin^2 x=1 \Rightarrow \sin x=1-\sin^2 x$

$\sin x=\cos^2 x \Rightarrow \sin^2 x=\cos^4 x$

$\therefore \cos^2 x+\cos^4 x=\sin x+\sin^2 x=1$

51. **Ans. (c)** $\sin 15^\circ=\dfrac{\sqrt{3}-1}{2\sqrt{2}}$

52. **Ans. (d)** $\sin A=\sin B$ and $\cos A=\cos B$

$\Rightarrow \sin(A-B)=\sin A\cos B-\cos A\sin B$

$=\sin A\cos B-\cos B\sin A=0$

53. **Ans. (c)** $\sin x\cos x = \dfrac{1}{2}\times 2\sin x\cos x=\dfrac{1}{2}\sin 2x$

As $|\sin 2x|\le 1 \Rightarrow |\sin x.\cos x|=\left|\dfrac{1}{2}\sin 2x\right|\le\dfrac{1}{2}$

54. **Ans. (b)** $(A+B+C)^n$

No. of terms is ${}^{n+3-1}C_{3-1}={}^{n+2}C_2$ and ${}^{n+2}C_2$

$=\dfrac{(n+2)!}{2!(n+2-2)!}=\dfrac{(n+2)!}{2!(n)!}=\dfrac{(n+2)(n+1)}{2}$

55. **Ans. (c)**

A(2, -2) B(8, 4)

D C(5, 7)

$BC=\sqrt{(8-5)^2+(4-7)^2}=\sqrt{9+9}=3\sqrt{2}$

Since AD = BC

By options

Distance of (2, -2) and (-1, 1)

$\sqrt{(2+1)^2+(-2-1)^2}=\sqrt{9+9}=\sqrt{18}=3\sqrt{2}$

56. **Ans. (a)** $\left(\dfrac{3}{2}x^2-\dfrac{1}{3x}\right)^9$

General term is $T_{r+1}={}^9C_r\left(\dfrac{3}{2}x^2\right)^{9-r}\left(-\dfrac{1}{3x}\right)^r$

$=(-1)^r\,{}^9C_r\left(\dfrac{3}{2}\right)^{9-r}\left(x^2\right)^{9-r}\dfrac{1}{3^r}\dfrac{1}{x^r}$

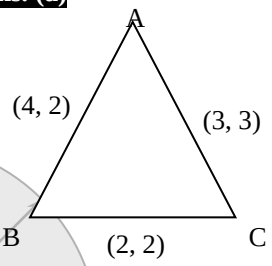
Put degree of x = 0 to find term independent of x.

$18-2r-r=0 \Rightarrow 18-3r=0 \Rightarrow r=6$

$T_7={}^9C_6\left(\dfrac{3}{2}\right)^3(-1)^6\left(\dfrac{1}{3}\right)^6=84\times\dfrac{1}{3^3}\times\dfrac{1}{2^3}$ as ${}^9C_6=84$

$T_7=\dfrac{84}{27\times 8}=\dfrac{7}{18}$

57. **Ans. (a)**



As centroid of triangle is same as centroid of triangle formed by mid points

(4, 2), (2, 2) ,(3, 3)

Centroid is $\left(\dfrac{4+2+3}{3},\dfrac{2+2+3}{3}\right)=\left(3,\dfrac{7}{3}\right)$

58. **Ans. (a)** $y^2=8x$ as $y^2=4ax \Rightarrow a=2$

focus is (a, 0) i.e. (2, 0)

59. **Ans. (b)** $3x+4y=9$ …(i)

$6x+8y=15$ …(ii)

Two lines are parallel

$\therefore$ $a_1x+b_1y=d_1$

$a_1x+b_2y=d_2$

distance is $\dfrac{|d_1-d_2|}{\sqrt{a_1^2+b_1^2}}$

(i) × 2 $\Rightarrow$ $6x+8y=18$

$6x+8y=15$

$\dfrac{18-15}{\sqrt{6^2+8^2}}=\dfrac{3}{\sqrt{100}}=\dfrac{3}{10}$

60. **Ans. (b)** Center of circle passing through (0, 0), (1, 1) and (-1. 1)

Since from centre (x, y) distance of 3 points is same i.e. Distance between (x, y) and (0, 0) and (1, 1) and (-1, 1) is same by options (b) i.e. (0,1)

61. **Ans. (b)** $x^2+y^2-6x+2y=c$

centre is (3, - 1) will satisfy diameter by options (b) is right i.e. $x+3y=0$

62. **Ans. (a)** $\lim_{x\to 0}\frac{\sqrt{1+x}-\sqrt{1-x}}{x}$

By L'Hospital Rule

$$=\lim_{x\to 0}\frac{\frac{1}{2\sqrt{1+x}}+\frac{1}{2\sqrt{1-x}}}{1}=\lim_{x\to 0}\frac{1}{2}+\frac{1}{2}=1$$

63. **Ans. (d)** $f(x)=\sin^{-1}\left[\frac{2x}{1+x^2}\right]$

Put x = tan θ

$=\sin^{-1}\left[\frac{2\tan\theta}{1+\tan^2\theta}\right]$ = $\sin^{-1}$ [sin 2θ] = 2 θ = 2 $\tan^{-1}$x

f(x) = 2$\tan^{-1}$x

$$f'(x)=\frac{2}{1+x^2}\Rightarrow f'(1)=\frac{2}{1+1}=1$$

64. **Ans. (b)** $f(x)=x^n \Rightarrow f^n(x)=n!$

65. **Ans. (c)** $y^2 = x + \sin x$ …(i)

$$2y\frac{dy}{dx}=1+\cos x$$

Tangent is parallel to x-axis i.e. $\frac{dy}{dx}=0$

$\frac{dy}{dx}=\frac{1+\cos x}{2y}=0\Rightarrow \cos x = -1 \Rightarrow x = (2n+1)\pi$

At these points on curve sin x = 0

$\therefore y^2 = x$ i.e., parabola

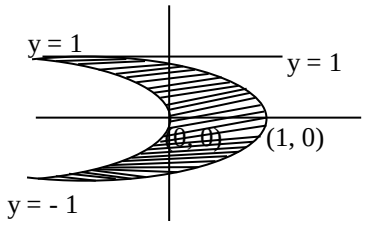
66. **Ans. (x)**

67. **Ans. (c)** $I=\int\frac{\cos\sqrt{x}}{\sqrt{x}}dx$

Put $\sqrt{x}=t\Rightarrow\frac{1}{2\sqrt{x}}dx=dt\Rightarrow\frac{1}{\sqrt{x}}dx=2dt$

$I=2.\int\cos t dt\Rightarrow I=2\sin\sqrt{x}+c$

68. **Ans. (d)** $x = -2y^2$, $x = 1 - 3y^2$



Intersection points are y = - 1, 1

$$A=\int_{-1}^{1}1-3y^2-\left(-2y^2\right)dy=\int_{-1}^{1}1-3y^2+2y^2dy$$

$$=\int_{-1}^{1}\left(1-y^2\right)dy=\left[y-\frac{y^3}{3}\right]_{-1}^{1}=\frac{4}{3}$$

69. **Ans. (c)** As slope of curve

$$\Rightarrow\frac{dy}{dx}=\frac{2y}{x}\Rightarrow\frac{dy}{y}=\frac{2}{x}dx$$

$\Rightarrow$ Integrate $\Rightarrow$ log(y) = 2log|x| + c

As passes through (1, 1)

$\Rightarrow$ log 1 = 2log 1 + c $\Rightarrow$ c = 0

$\Rightarrow$ given curve is logy = 2log x = $\log x^2$

$\Rightarrow x^2 = y$

70. **Ans. (a)**

71. **Ans. (b)** Mean of 200 items are 50

$$\frac{x_1+x_2+.....+x_{200}}{200}=50$$

$x_1 + x_2 + \ldots\ldots + x_{200} = 10000$

$x_1 + x_2 + \ldots\ldots + x_{198} + 92 + 8 = 10000$

$x_1 + x_2 + \ldots\ldots + x_{198} = 9900$

correct mean $=\frac{x_1+x_2+.....+x_{198}+192+88}{200}$

$$=\frac{9900+280}{200}=50.9$$

72. **Ans. (d)**

73. **Ans. (c)** Here we have 8 – white balls.

4 – Red balls.

So P(Two Red Balls) $=\frac{{}^4C_2}{{}^{12}C_2}=\frac{6}{66}=\frac{1}{11}$

74. **Ans. (b)** Two dice are thrown

So sample space has 6 × 6 = 36 cases.

As total score is prime

$\Rightarrow$ E = {(1, 1), (1, 2), (2, 1) (1,4), (4, 1) (1, 6) (6, 1) (2, 3), (3, 2), (2, 5), (5, 2), (3, 4), (4, 3), (5, 6),(6, 5)}

$\Rightarrow$ n(E) = 15

$\Rightarrow$ P(E) $=\frac{15}{36}=\frac{5}{12}$

75. **Ans. (d)** a + ib < c + id is meaningful only if b = 0 and d = 0

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In a day, when you don't come across any problems – you can be sure that you are travelling in the wrong path…… SWAMI VIVEKANANDA