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Institute for IAS Examination

UPSC CSE Prelims 2023

Paper II – CSAT

for Prelims 2023

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Answer Key
&
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CSAT UPSC Prelims 2023 - Answer Key							
SET - B							
1. (d)	11. (b)	21. (c)	31. (a)	41. (b)	51. (d)	61.(d)	71. (a)
2. (c)	12. (b)	22. (c)	32. (d)	42. (a)	52. (a)	62. (a)	72. (a)
3. (d)	13. (b)	23. (b)	33. (c)	43. (d)	53. (b)	63. (c)	73. (a)
4. (c)	14. (a)	24. (a)	34. (d)	44. (d)	54. (c)	64. (b)	74. (c)
5. (a)	15. (c)	25. (d)	35. (b)	45. (d)	55. (d)	65. (a)	75. (c)
6. (c)	16. (b)	26. (d)	36. (b)	46. (a)	56. (c)	66. (d)	76. (c)
7. (d)	17. (a)	27. (d)	37. (a)	47. (d)	57. (a)	67. (c)	77. (a)
8. (d)	18. (c)	28. (a)	38. (a)	48. (a)	58. (a)	68. (a)	78. (c)
9. (c)	19. (b)	29. (c)	39. (d)	49. (a)	59. (a)	69. (d)	79. (b)
10. (d)	20. (c)	30. (a)	40. (c)	50. (c)	60. (b)	70. (b)	80. (b)

Q1.
Answer: d

Q2.
Answer: c

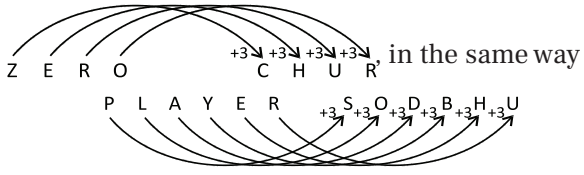
Q3.
Answer: d

Q4.
Answer: c

Q5.
Answer: a

Q6.
Answer: c
Explanation:
1. Consider the (worst) case that the first 13 balls one black, next 19 one blue, next 25 one green, next 27 one yellow, next 37 one red, next 53 one white.
Till now 180 – 6 = 174 balls have been drawn and no complete group has been down. Now any ball drawn next will complete a group definitely. Hence this statement is correct.
2. Consider the case that first 54 ball are white, next 38 are red, next 28 are yellow, next 26 are green, next 20 are blue. Till now 166 balls have been drawn, yet all colours are not present. The next ball drawn will fulfill the requirement. Hence this statement is correct.
Hence option c.

Q7.
Answer: d
Explanation:



Hence, option d.

Q8.
Answer: d
Explanation:
C = D > F > A > B > E
All five statements are needed.
Hence, option d

Q9.
Answer: c
Explanation:
Analysis of options:

(a) $\begin{matrix}\boxed{D}\\ A = B;\ \downarrow\end{matrix}$ {There's no connective established between B & E}

$\boxed{E} \leftrightarrow C$

Hence, not sufficient

(b) $Ⓒ \leftrightarrow Ⓐ = \boxed{B}\ ;\ \begin{matrix}D\\ \downarrow\\ \boxed{E}\end{matrix}$ {There's no connective established between B & E}

Hence, not sufficient

(c) $\begin{matrix}D\\ \downarrow\\ \boxed{E}\end{matrix} \leftrightarrow Ⓒ \leftrightarrow Ⓐ = \boxed{B}$ {Using all form statements, it's evident that E is brother-in-law of B}

Hence, option c.

Q10.
Answer: d
Explanation:
Option (D) is the answer as it contains one composite number (91), all the other options contain only prime numbers.
Hence, option d.

Q11.
Answer: b

Q12.
Answer: b

Q13.
Answer: b

Q14.
Answer: a
Explanation:
(i) $7 \oplus 9 \oplus 10 = 8$
Code : 7 + 9 + 10 = 26 and 2 + 6 = 8
(ii) $9 \oplus 11 \oplus 30 = 50$
Code : 9 + 11 + 30 = 55 and 5 + 0 = 5
(iii) $11 \oplus 17 \oplus 21 = 13$
Code : 11 + 17 + 21 = 49 and 4 + 9 = 13

Therefore 23 ⊕ 4 ⊕ 15 will be coded as follows :
23 + 4 + 15 = 42 and 4 + 2 = 6.
Hence, option a.

Q15.
Answer: c
Explanation:
For 7x + 96 to be divisible by x, 96 should be divisible by x.
$96 = 2^5 \times 3$, so it has 12 factors {(5 + 1) × (1 + 1)}
Therefore there are 12 possible values of x.
Hence, option c.

Q16.
Answer: b
Explanation:
Take the greatest possible four digits i.e 9, 8, 7 and 6 for p, q, r and s. (not in the same order)
p + q + r + s = 30 and (p + q) (r + s) is to be maximized the highest product of two numbers, whose sum is given, is obtained when both are equal.
Hence, 15 × 15 = 225 is the greatest possible product.
{Like (9 + 6) (8 + 7)}
Hence, option b.

Q17.
Answer: a
Explanation:
1001 is a multiple of 13.

When a 3-digit number is multiplied with 1001, a six digit. Pattern, of the type 'abcabc' is fomed.
So, if 999 is multiplied with 1001, it will make 999999, which is a multiple of 13.
If 99999999 ..... (99 times) is written, then every group of 6 nines will not give any remainder when divided by 13, as follows :

$$\underbrace{999999\,|\,999999\,|\,999999\,|\,.....|}_{16\,\text{groups}\,(=96\,\text{digits})}\ \underbrace{999}_{\text{last 3 digits}}$$

Its only last three 9's which one responsible for any remainder.

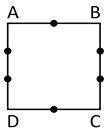
So, $13\overline{)999}\,\overline{)76}$ -988 $\overline{11}$; 11 is the remainder.

Hence, option a.

Q18.
Answer: c
Explanation:
$(111111111)^2 = 12345678987654321$
Sum of its digits = 81
Hence, option c.

Q19.
Answer: b
Explanation:
Consider 90 two-digit numbers. (from 10 to 99)
Sum of all the digits at units place = (1 + 2 + 3 ..... + 9) × 9.
= 45 × 9 = 405
Sum of all the digits at tens place = 10(1 + 2 + ... + 9) = 450
Hundred's place = 1
So, sum of all the digits = 405 450 + 1 = 856
Hence, option b.

Q20.
Answer: c
Explanation:
No three of the six highlighted points are collinear.



So, total number of triangles = ${}^6C_3$
= 20
Hence, option c.

Q21.
Answer: c

Q22.
Answer: c

Q23.
Answer: b

Q24.
Answer: a

Q25.
Answer: d

Q26.
Answer: d
Explanation:
D(100A + 10B + C) = 3000 + 700 + 10D + D = 3700 + 11D
(i) If D = 4, the number [3700 + 11D] is divided by D(= 4)
In this case, A, B and C are 9, 3 and 6 respectively.
(ii) If D = 5, the number [3700 + 11D] is divided by D(= 5)
In this case, A, B and C are 7, 5 and 1.
Hence there's no unique value for (A + B + C)
Hence, option d.

Q27.
Answer: d
Explanation:
Any number of the form 'XYZXYZ' is a multiple of 1001 (in a way that 1001 'XYZ' = XYZXYZ)
So, irrespective of the values of X, Y and Z, the number XYZXZY is definitely divided by 1001.
$1001 = 7 \times 11 \times 13$.
Hence option d.

Q28.
Answer: a
Explanation:
The cubes in the question one found when all the surface cubes are removed (Let's call them core)
If the total number of smaller cubelets in n^3, then the number of core cubes is $(n-2)^3$.
Here n = 5, so $(n-2)^3 = 27$.
Hence, option a.

Q29.
Answer: c

Q30.
Answer: a
Let's say the total amount of work = 48 units.
Hence A would do 6 units a day, B would do 3 units a day and c would do 4 units a day.
Consider the following presentation:

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu
A	B	C	A	B	C	A	B	C	A	B
6	3	4	6	3	4	6	3	4	6	3

48 units done in 11 days.
Hence, option a.

Q31.
Answer: a

Q32.
Answer: d

Q33.
Answer: c

Q34.
Answer: d
Explanation:
Worst case analysis:
In this case Raj would be completing a red pair in the end. So, let's say Raj drowns 18 white and 16 black shoes first and then 9 red shoes (all of left foot).
In this way Raj has drawn 44 shoes and a red pair is still not complete. The net shoe drawn will complete a red pair.
Hence option d.

Q35.
Answer: b
Explanation:

	6s	4s	1s
1	4	0	1
2	3	1	1
3	3	0	4
4	2	3	1
5	2	2	5

6	2	1	9
7	2	0	13
8	1	4	3
9	1	3	7
10	1	2	11
11	1	1	15
12	1	0	19
13	0	6	1
14	0	5	5
15	0	4	9
16	0	3	13
17	0	2	17
18	0	1	21
19	0	0	25

Therefore, 19 ways.
Hence, option b.

Q36.
Answer: b
Explanation:
1) Not possible. If 3 go in their respective envelopes, then fourth has to go in the correct envelope.
2) The number of ways of selecting (choosing) 2 letters out of 4 = $^4C_2$ = 6 ways. These two letters will go in their correct envelopes. The remaining two can go in wrong envelopes only in one way (in each case).

Therefore, total 6 ways.
Hence, option b.

Q37.
Answer: a
Explanation:
$100 = 2^2 \times 5^2$
In the given number, there one are two multiplies of 5(85 and 95) and one multiple of 4 (96) which will make the product ending with double zeroes. Hence the remains will be zero.
Hence, option a.

Q38.
Answer: a
Explanation:
The given expression is $(57242)^{945}$ 945 is of the form 4n + 1, therefore the units digit will be same as 2′, which is 2.
Hence, option a.

Q39.
Answer: d
Explanation:
Consider the presentation

	A	B	C
+	D	E	F
1	1	1	1

Since, none of the six digits is zero, C + F must be equal to 11.
Now B + E must be equal to 10 {because 1 as casey-over from C + F will be added to make it 11}

Similarly A + D = 10
Therefore A + D + B + E + C + F = 10 + 10 + 11 = 31
Hence, option d.

Q40.
Answer: c
Explanation:
As per the given situation, the value of D would be 199. So $\frac{199}{19}=10\frac{9}{19}$ (least possible)
Therefore the difference between hundred's and units place = 8
Hence, option c.

Q41.
Answer: b

Q42.
Answer: a

Q43.
Answer: d

Q44.
Answer: d
Explanation:
Here we have to find remainder

i.e. $\frac{2^{192}}{6}=\frac{2.2^{191}}{6}=\frac{2^{191}}{3}$

$\Rightarrow \quad \overset{+2\quad -1}{\boxed{\frac{(2)^{191}}{3}}}=\frac{(-1)^{191}}{3}=\frac{-1}{3}\overset{+1}{\underset{-2}{\lfloor}}$

$\Rightarrow \quad \frac{2}{3}\rightarrow \text{Remainder}=2\times\underset{\downarrow}{\frac{2}{}}=4$

Because we have solve the fraction by 2.
Hence, option d.

Q45.
Answer: d
Explanation:

A B C _ _	A B C _ D	A B B C D	_ A B C D
↓ ↓	↓	↓	↓
D D	C		A

Here, if we observe then in each slot two alphabet are repeated 2 are side by side.
Ex. D D | C C | B B | A A
Hence, option d.

Q46.
Answer: a
Explanation:

D E F
G H I
9 7 5

Here, E = 0, F = 8

$$\begin{array}{r} D08 \\ \underline{GHI} \\ 975 \end{array}$$

So, value of I = 7, H = 6

Now the value of D may be either 5 or 4

Case-I : when value of D is 4

then, xy = 408

factors of 408 = 2 × 2 × 2 × 3 × 17

x and y are two digit numbers

so, pairs formed are

{ (i) 27 & 17, (ii) 34 & 12 }

A + B + C = 1 + 2 + 3 = 6

Since no digits are same

So, value of A = 1, B = 2, C = 3

Case-II : when value of D is 5

then, xy = 508

factors of 508 = 2 × 2 × $\underset{\downarrow}{127}$

Since it is 3 digit

So, this will not be the case.

Hence, option a.

Q47.
Answer: d
Explanation:

Statement		**Conclusion**
True statement	→	either P or Q get job
False statement	→	neither R nor S get job
True statement	→	maximum of two among R, S & T get the job

1 → wrong
2 → wrong
Hence, option d.

Q48.
Answer: a
Explanation:

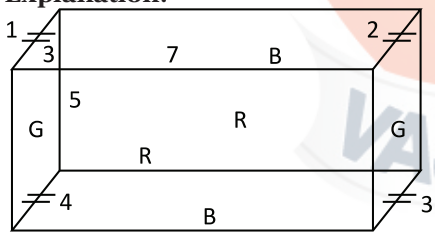
	Statement	**Conclusion**
I	→	If P → ✔, then Q & S → ✔
II	→	If R & S → ✔, then T → ✘

Now on the basis of above information

1. → If T is true → R → false or S → false or R & S → false

Now, when S is false then P is false.
∴ Either one or atleast P & R must be false.
So, it is true.
2. → It is wrong. As P is dependent on both Q & S.
Hence, option a.

Q49.
Answer: a
Explanation:



Total volume of cuboid = 7 × 5 × 3 = 105 cm^3
Total number of cube of 1 cm^3 = 105
1. **No painted face**
Total number of cube of 1 cm^3 = 5 × 3 × 1 = 15
It is true.
2. Number of cubes of 1 cm^3 with two faces painted (Blue & Green)
It will be 4
It is wrong.
Hence, option a.

Q50.
Answer: c
Explanation:

I	N	C	O	M	P	R	E	H	E	N	S	I	B	I	L	I	T	I	E	S
T	S	S	R	P	O	N	N	M	L	I	I	I	I	I	H	E	E	E	C	B

Only 2 positions are matching in both the cases.

Hence, option c.

Q51.
Answer: d

Q52.
Answer: a

Q53.
Answer: b

Q54.
Answer: c

Q55.
Answer: d

Total marks deducted were 4.

Now, how these are going to be distributed among 4 papers are as follows.

Case 1 → When all 4 marks are deducted from 1 paper.

Total ways = 4

Case 2 → When 1 marks is deducted from each 4 paper.

Total ways = 1

Case 3 → When 3 marks is deducted from 1 paper & 1 marks is deducted from 1 paper.

Total ways = 12 {Since $4p_1 \times 3p_1 = 12$)

Case 4 → When 2 marks are deducted from any 2 papers.

Total ways = 6

Case 5 → When 2 marks are deducted from 1 paper & 1 marks are deducted from 2 papers.

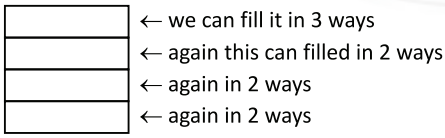
Total ways = 12

So, overall ways = 12+6+12+1+4=35 ways.

Hence, option d.

Q56.
Answer: c
Explanation:

Four horizontal strips



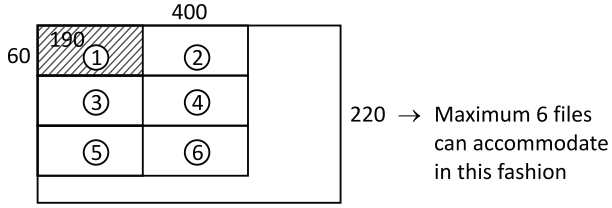
So, depending upon question total number of ways in which we can fill the strips are

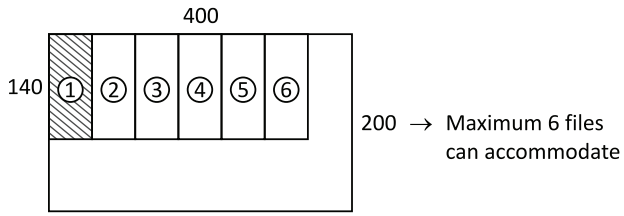
→ $3 \times 2 \times 2 \times 2 = 24$ ways

Hence, option c.

Q57.
Answer: a
Explanation:

Sol.





So, maximum 6 files.

Hence, option a.

Q58.

Answer: a

Explanation:

Understanding from the question, there are two tasks - 1 and 2 and five persons - P, Q, R, S and T. As per the given constraints, the number of ways of assigning tasks to P and Q is just 1 (because P as well as Q can be given only Task -2)

No. of ways of assigning task to T is 2 (T can be given any of the two tasks)

No. of ways of assigning tasks to R and S is 3 (R-1, S-2 ; R-2, S-1 ; R-2, S-2)

So, total number of ways of assigning tasks to five persons is 1x2x3 = 6

Hence, option a.

Q59.

Answer: a

Explanation:

According to question

1. Maximum number of coins required to buy

78 gm = 7
↓
50 gm → 1 coin
10 gm → 2 coins
24 gm → 4 coins
Statement 1 is correct.

2. To measure 78 gm, minimum we have to use 7 coins.
So, it is wrong.

Hence, option a.

Q60.
Answer: b
Explanation:
According to information given in question.
$A + B \rightarrow A > B$
$A - B \rightarrow A \leq B$
$A \times B \rightarrow A \geq B$
$A \div B \rightarrow A < B$
$A \pm B \rightarrow A = B$
Statement → conclusion (we derived)

$$\left.\begin{array}{l} P \times Q \longrightarrow P \geq Q \\ P - T \longrightarrow P \leq T \\ T \div R \longrightarrow T < R \\ R \pm S \longrightarrow R = S \end{array}\right\} S = R > T \geq P \geq Q$$

Conclusion:
1. $Q \pm T \rightarrow Q = T \rightarrow$ wrong
2. $S + Q \rightarrow S > Q \rightarrow$ correct
Hence, option b.

Q61.
Answer: d

Q62.
Answer: a

Q63.
Answer: c

Q64.
Answer: b
Explanation:
The pattern is:
$1^{st}, \xrightarrow{+1} 2^{nd}, \xrightarrow{+2} 4^{th}, \xrightarrow{+3} 7^{th}, \xrightarrow{+4} 11^{th}, \xrightarrow{+5} 16^{th}, \ldots\ldots\ldots$
Since the children are making a circle, the ring will come back to 1^{st} child if the number in the pattern is (40x + 1), like 41^{st}, 81^{st}, 121^{st}, etc.
So, $1 + (1 + 2 + 3 + \ldots\ldots\ldots) = 40x + 1.$
$\Rightarrow$ $1 + 2 + 3 + \ldots\ldots\ldots + x = 40x$

$$\frac{x(x+1)}{2} = 40x$$

x = 15 does the work

Hence, option b.

Q65.
Answer: a
Explanation:
z z y y x x x x w w w w w ..... A.
In the above sequence, the total number of terms
= 2 + 3 + ... + 27 = 13 × 29 = 377
The middle term is 189th term.
Therefore 2 + 3 + 4 + ... x ≤ 189
x(x + 1) ≤ 380
x = 19 fits the bill.
So, the 19th letter (starting from Z) would be 8th letter (27 – 19 = 8) starting from A, which is H.
Hence, option a.

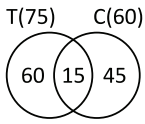
Q66.
Answer: d
Explanation:
St. 1. $p \times q > o$ establishes two things
(i) Neither of p or q is zero
(ii) Both have the same sign.
But doesn't tell us anything about values.
St. 2. $p^2 > q^2$
Consider (p, q) as (4, 3) and (–4, –3). Both the pairs fit the bill but do not ascertain.
If p > q or q > p.
Even the combination of both the above statement doesn't decide if p > q or q > p.
Hence, option d.

Q67.
Answer: c
Explanation:
If p + q – r > p – q + r
then q > r ; so p doesn't matter.
Therefore, neither statement 1 alone nor statement 2 alone will answer the question.
Combining both the statements:

$$p \div q > o \quad \Rightarrow \quad r > q$$
$$\underline{r - p > o}$$
$$r - q > o$$

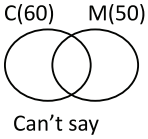
Since q – r < o, the answer is confirmed no.
Hence, option c.

Q68.
Answer: a
Explanation:



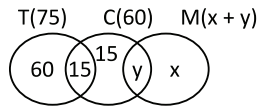
120 took T or C.

St. 1:



Can't say

St. 2:



Total number of people = 120 + x
Milk only = x
$\Rightarrow$ 120 + x = 5x
$\Rightarrow$ x = 30 ; sufficient
Hence, option a.

Q69.
Answer: d
Explanation:
St. 1: The digits are 1, 2, 3; but there would be 6 three-digit numbers possible with these digits.
Hence, option d.

Q70.
Answer: b

Q71.
Answer: a

Q72.
Answer: a

Q73.
Answer: a

Q74.
Answer: c
Explanation:
Here principal and amount both are same over the period of same 1 year.
Since R (% annually) is compound half-yearly
and S (% annually) is compounded yearly
So, here amount is same, then
S > R
Hence, option c.

Q75.
Answer: d
Explanation:
Since 1186 is divided by the given no leaves remainder 31.
So, 1186 – 31 = 1155 ← this will be exactly divisible.

5|1155
11|231
7|21
3

Hence factors of 1155 → 5 × 11 × 7 × 3
Since, it is said that remainder is 31, so, numbers should be greater than 31, hence all those numbers are:
(1) 3 × 11 = 33 (2) 5 × 7 = 35 (3) 5 × 11 = 55
(4) 7 × 11 = 77 (5) 15 × 7 = 105 (6) 15 × 11 = 165
(7) 15 × 7 × 11 = 1155 (8) 35 × 11 = 385 (9) 77 × 3 = 231
Total such number are → 9.
Hence, option d.

Q76.
Answer: c
Explanation:
Information given are:
p < q < r &
pp + qq + rr = tto
it means we have choose all the values of p, q & r such that we get o, at unit digit of tto ← 3 digit number.
Case-I : When p = 1

	p	**q**	**r**		
(a)	1,	2,	7	→	o
(b)	1,	3,	6	→	o
(c)	1,	4,	5	→	o

Case-II : When p = 2
(a) 2, 3, 5 → o
Case-III : When p = 3
(a) 3, 8, 9 → o
Case-IV : When p = 4
(a) 4, 7, 9 → o
Case-V : When p = 5
(a) 5, 6, 9 → o
1. Possible value of P = 5 (1, 2, 3, 4 & 5) → right
2. Possible value of Q = 6 (2, 3, 4, 6 & 8) → right
Hence, option c.

Q77.
Answer: a
Explanation:
All 4 digit numbers which are less than 2000 are →

1234
1243
1324
1342
1423
+ 1432
7998

Hence, option a.

Q78.
Answer: c
Explanation:
Since, it is a case of circular arrangement but here n – 1 will not be applicable.
So, number of selection will be in 12 ways.
Hence, option c.

Q79.
Answer: b
Explanation:
Since, it is based on calendar, so here we have to find out total number of odd days

So, divide 10^{10} by 7, whatever, remainder we get that will be the number odd days.

$$\frac{10^{10}}{7} = \frac{(10^2)^5}{7} = \frac{(100)^5}{7} \quad (+2, -5) \quad = \frac{2^5}{7} = \frac{32}{7} \quad (+4, -3)$$

Remainder is 4. So, if today is Sunday then on 10^{10} day, it will be Thursday.

Hence, option b.

Q80.

Answer: b

Explanation:

Duration of time after which each signal changes colours are:

$1^{st} \rightarrow 25$ sec

$2^{nd} \rightarrow 39$ sec

$3^{rd} \rightarrow 60$ sec

Now, all three will become red after, take LCM of 25, 39, 60

$5 \mid 25, 39, 60$

$5 \mid 5, 39, 12$

$5 \mid 1, 39, 12$

$5 \mid 1, 39, 6$

$5 \mid 1, 39, 3$

$5 \mid 1, 13, 1$

$1, 1, 1$

LCM = $5 \times 5 \times 2 \times 2 \times 3 \times 13$

= 3900

So, all 3 will become red after 3900 sec.

Again, they will become green after 3900 sec.

So, total time from green to green

= 3900 + 3900 = 7800 sec

$$= \frac{7800}{60} \text{ min}$$

= 130 min

= 2 hr 10 min

So, they become again green at

2 pm + 10 min

i.e 4:10 pm

Hence, option b.

Optional Test Series

- Agriculture
- Philosophy
- Mathematics
- Commerce & Accountancy
- Public Administration
- Political Science & IR
- Economics
- Psychology
- Sociology
- Geography
- Anthropology
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