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Code No. T-2121
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## Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2024

CSS
DATA SCIENCE


## General Instructions

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be $(\checkmark)$ 'tick marked' only in the "Response Sheet" provided.
3. Negative marking : $\mathbf{0 . 2 5}$ marks will be deducted for each wrong answer .

Time : 2 Hours
Max. Marks : 100

To be filled in by the Candidate

| Register <br> Number | in Figures |  |  |  |  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  | in words |  |  |  |  |  |  |  |  |

$\square$

Choose appropriate answer from the options in the questions.
(100 $\times 1$ = 100 marks)

1. Find the GCD of $1.08,0.36$ and 0.9
A. 0.03
B. 0.9
C. 0.18
D. 0.108

2. If $P$ is an integer point with a value 1000 , then what will be the value of $P+5$ ?
A. 1020
B. 1005
C. 1004
D. 2020
3. Simplify the following expression : Y $=A \bar{B} C+A \bar{B} \bar{C}$
A. $Y=C$
B. $Y=B$
C. $Y=A$
D. $Y=A \bar{B}$
4. Total number of Boolean functions possible over $n$ Boolean variables are
A. $2^{2 n}$
B. $2^{n}$
C. $n^{2 n}$
D. None of these
5. Two finite sets have $m$ and $n$ elements. The total number of subsets of the first is 56 more than the total number of subsets of the second set. Then values of $m$ and $n$ are
A. 7,6
B. 6,3
C. 5,1
D. 8,7
6. The number of one-to-one functions from $\{1,2,3\}$ to $\{1,2,3,4,5\}$ is
A. 125
B. 243
C. 10
D. 60
7. What is the range of the function $f(x)=\frac{|x-1|}{x-1}$ ?
A. $\{3,5\}$
B. $\{0,2\}$
C. $\{-1,1\}$
D. $\{-2,4\}$
8. Operations carried out by NOT gate is also known as
A. converting
B. reverting
C. inverting
D. reversing
9. Find the reminder when the smallest 6 -digit number divisible by 12,15 and 25 is divisible by 9
A. 3
B. 7
C. 2
D. 0
10. Let $n(A)=x$ and $n(B)=y$, then the total number of non-empty relations that can be defined from $A$ to $B$ is
A. $2 x^{y}$
B. $3 y^{x}-1$
C. $7 x y-1$
D. None of these
11. What is the range of $f(x)=\frac{\sin \left(\pi\left[x^{2}+1\right]\right)}{x^{4}+1}$, where [ ] is the greatest integer function?
A. $[0,10]$
B. $[-1,11]$
C. $\phi$
D. None of these
12. Which of the following are correct file opening modes in $C$ ?
A. $r$
B. $r b$
C. Both of them
D. None of these
13. If $f(x)+f(y)=f(x+y) f(x-y) \forall x, y$, then $f(x)$ is
A. Even
B. Odd
C. Neither even nor odd
D. Both even and odd
14. How many solutions does the equation $x+y+z=11$ have, where $x, y, z$ are non negative integers
A. 78
B. 68
C. 89
D. 99
15. If the set $A$ contains 23 elements and $B$ contains 16 elements, then the number of one-one and onto mapping from $A$ to $B$ is :
A. 720
B. 120
C. 0
D. None of these
16. The Boolean function $A B+A C$ is equivalent to
A. $A B+A C+B C$
B. $A^{\prime} B^{\prime} C^{\prime}+A^{\prime} A A+B^{\prime} C B$
C. $A A+B B+C C$
D. $A B C+A B C^{\prime}+A B^{\prime} C$
17. Let $T$ be the set of all triangles in the euclidean plane and let a relation $R$ on $T$ be defined as $a R b$ if $a$ is congruent to $b \forall a, b \in T$. Then $R$ is
A. reflexive but not transitive
B. equivalence
C. more than one of above
D. None of these
18. Evaluate $\lim _{x \rightarrow 4} \frac{3 x-4}{x^{2}-2 x-12}$
A. undefined
B. 0
C. $\infty$
D. None of these
19. The function $f(x)=\log x$
A. has maxima at $x=e$
B. has minima at $x=e$
C. has neither maxima nor minima
D. all of these
20. The sum of two numbers is $k$, the maximum value of the product of the first and the square of second is
A. 4
B. 1
C. 3
D. 0
21. Number of non negative integer solutions to the inequality $\left(x_{1}+x_{2}+\ldots .+x_{6}\right) \leq 15$ is
A. $p(21,6)$
B. $c(15,6)$
C. $p(15,6)$
D. $x(21,6)$
22. A man is known to speak truth 3 out of 4 times. He throws a dice and reports that it is a six. Find the probability that it is actually a six
A. $\frac{1}{8}$
B. $\frac{5}{8}$
C. $\frac{2}{7}$
D. $\frac{3}{8}$
23. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected is the team has no girl?
A. 12
B. 21
C. 14
D. None of these
24. What is the type of the int data type(in bytes) in C ?
A. 4
B. 8
C. 2
D. 7
25. Mean of 9 observations was found to be 35 . Later on, it was detected that an observation 81 was misread as 18 . Find the correct mean of the observation.
A. 42
B. 24
C. 80
D. None of these
26. The last term of an AP $21,18,15, \ldots$ is -351 . Find $n^{\text {th }}$ term :
A. 213
B. 123
C. 312
D. -231
27. If $A$ and $B$ are square matrices of order 2 , then $(A+B)^{2}=\ldots$
A. $A^{2}+2 A B+B^{2}$
B. $A^{2}+A B+B A+B^{2}$
C. $A^{2}+2 B A+B^{2}$
D. None of these
28. The number of arrangements of six identical balls in three identical bins is
A. 4
B. 22
C. 7
D. None of these
29. Which of the following is not correct?
A. $\quad \log (2+3)=\log (2 \times 3)$
B. $\log _{10}=\log _{1}$
C. More than one above
D. None of these
30. If for some numbers $a$ and $d$, if first term is $\frac{1}{a}$, second term is $\frac{1}{a+d}$ third term is $\frac{1}{a+2 d}$ and so on, then $5^{\text {th }}$ term of sequence is :
A. $a+4 d$
B. $a-4 d$
C. $\frac{1}{a+4 d}$
D. None of these
31. $\int \frac{1}{1+x^{2}}$ for limit $[0,1]$
A. $\frac{2 \pi}{3}$
B. $\frac{\pi}{2}$
C. $\frac{7 \pi}{6}$
D. None of these
32. If $A$ is a subset of $B$ and $B$ is a subset of $C$, then the cardinality of $A \cup B \cup C$
A. Cardinality of $C$
B. Cardinality of $B$
C. Cardinality of $A$
D. None of these
33. The maximum value of the function $f(x)=\sin x(1+\cos x)$ is :
A. $\frac{3 \sqrt{3}}{4}$
B. $\frac{3 \sqrt{3}}{2}$
C. $3 \sqrt{3}$
D. $\sqrt{3}$
34. Which of the following is an odd function?
A. $\sin x^{2}$
B. $\frac{a^{x}+1}{a^{x}-1}$
C. $x^{2}|x|$
D. None of these
35. Which of the following is an even function?
A. $f(x)=\sin x$
B. $f(x)=\frac{a^{x}+1}{a^{x}-1}$
C. $f(x)=x \frac{a^{x}-1}{a^{x}+1}$
D. None of these
36. One root of the equation $(x+1)(x+3)(x+2)(x+4)=120$ is
A. -1
B. 2
C. 1
D. 0
37. Let $\star: \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$ given by $(a, b) \rightarrow a+4 b^{2}$ is a binary operation, compute $(-5) \star(2 \star 0)$
A. 25
B. 11
C. 29
D. 34
38. If $A=5$, then find the number of commutative binary operations on $A$
A. $5^{15}$
B. $5^{7}$
C. $5^{3}$
D. None of these
39. If $R$ is a selection 'less than' from $A=\{1,2,4,5\}$ to $B=\{3,4\}$, the set of ordered pairs corresponding to $R$, then the inverse of $R$ is
A. $\{(3,1),(3,2),(3,3)\}$
B. $\{(4,1),(4,2),(4,3)\}$
C. $\{(4,3),(4,4),(4,5)\}$
D. None of these
40. The following propositional statement $(P \rightarrow(Q \vee R)) \rightarrow((P \wedge R) \rightarrow Q)$ is
A. Satisfiable but not valid
B. Valid
C. Contradiction
D. None of these
41. Let * be a binary operation defined on $R$ by $p^{*} q=\frac{p+2}{2} \forall p, q \in R$. Then * is
A. Commutative but not associative
B. Commutative and associative
C. Both of them
D. None of these
42. The number of all possible matrices of order $3 \times 3$ with each entry 0 or 1 is
A. 18
B. 81
C. 512
D. 521
43. The $A M$ of 10 items is 50 . If each item is increased by 5 , then new $A M$ would be :
A. 50
B. 55
C. 60
D. 45
44. Find the maximum value of $(x+8)(7-x)$
A. $\frac{240}{4}$
B. $\frac{200}{4}$
C. $\frac{255}{4}$
D. $\frac{225}{4}$
45. If $8 P(4, n)=6 P(2, n-1)$ then $n$ is
A. 8
B. 3
C. 6
D. None of these
46. If each exterior angle of regular polygon are $24^{\circ}$, then how many sides does regular polygon have
A. 10
B. 8
C. 15
D. 12
47. Which of the following propositions is not a tautology?
A. $\quad q \vee(q \rightarrow p)$
B. $(q \vee q) \rightarrow q$
C. $p \rightarrow(p \rightarrow q)$
D. None of these
48. If $A=\{1,2,5,7\}$ and $B=\{2,4,6\}$, then find the number of proper subsets of $A \cup B$
A. 127
B. 64
C. 63
D. 77
49. $P \rightarrow(Q \rightarrow R)$ is equivalent to
A. $(P \vee Q) \rightarrow R$
B. $(P \wedge Q) \rightarrow R$
C. $(P \vee Q) \rightarrow Q$
D. None of these
50. In every $n+1$ element subset of the set $(1,2,3, \ldots, 2 n)$, which of the following is correct?
A. At least two natural numbers which are prime to each other
B. At least three natural numbers which are prime to each other
C. There exists no consecutive natural numbers
D. None of these
51. The negation of the statement $(p \rightarrow q) \wedge r$ is
A. $p \wedge \sim p \vee(\sim p)$
B. $(p \sim p \wedge q) \wedge(\sim r)$
C. $(q \wedge \sim q) \wedge p$
D. None of these
52. The sides of an equilateral triangle is increasing at the rate of $2 \mathrm{~cm} / \mathrm{sec}$. At what rate is its area increasing when the side of the triangle is 40 cm .
A. $20 \sqrt{3} \mathrm{~cm}^{2} \mathrm{sec}$
B. $3 \sqrt{5} \mathrm{~cm}^{2} \mathrm{sec}$
C. $144 \mathrm{~cm}^{2} \mathrm{sec}$
D. None of these
53. If the 9 -digit number $45069 \times 4 \mathrm{y} 8$ is divisible by 44 , then what is the value of $(x-2 y)$ for the minimum value of $y$ :
A. 6
B. 4
C. 2
D. None of these
54. Let $f(x)=(-1)^{[6 x]}$ where [ ] denotes the greatest integer function, then
A. Range of $f$ is $\{-1,1\}$
B. $f$ is even
C. $f$ is odd
D. None of these
55. If $A=\{1\}$. How many elements $P[P(P(A))]$ contains
A. 16
B. 8
C. 14
D. 6
56. If $A$ is a skew symmetric matrix, then trace of $A$ is
A. 1
B. -1
C. 0
D. None of these
57. A man has two parents, 4 grandparents, 8 great grand parents and so on. Find the number of ancestors during the 8 generations preceding his own
A. 455
B. 450
C. 767
D. 510
58. The simplest measure of dispersion which defines the difference between values of the extreme items of $s$ series
A. MD
B. B. Range
C. $S D$
D. HM
59. How many words can be formed from the word 'DATA SCIENCE'?
A. 335654
B. 657499
C. 100000
D. None of these
60. Empty set is always
A. universal set
B. finite set
C. empty set
D. unknown set

61．How many elements are there in the complement of set $X$ ？
A． 0
B． 6
C．All the elements of $A$
D．None of these

62．What is the output of the following \＃include 〈stdio．h〉
int main（ ）\｛

$$
\begin{aligned}
& \text { for (int } x=10 ; x>=0 ; x--)\{ \\
& \text { int } z=x \&(x \gg 1) \text {; } \\
& \text { if ( } z \text { ); } \\
& \text { printf ("\% d", } x) ;\}
\end{aligned}
$$

\}
A． 763
B． 769
C． 678
D． 679

63．What will be the output of the following pseudocode；\＃include 〈stdio．h〉 int main（）
\｛

$$
\begin{aligned}
& \text { float } x=0.0 \\
& \text { long int } y=10 \\
& \text { printf ("\% d", size of }(x)==\text { size of }(x+y)) \text {; } \\
& \text { return } 0 \text {; }
\end{aligned}
$$

\}
A． 1
B． 0
C． 4
D． 8

64．The domain of the function $\log (\log (\sin x))$
A． $0<x<\pi$
B． $2 n \pi<x<(2 n+1) \pi$
C．empty set
D．none of these

65．The period of the function $f(x)=|\sin x|+|\cos x|$ is
A．$\pi$
B．$\pi / 2$
C． $2 \pi$
D．None of these
66. Three bells tolls together at intervals $9,12,15$ minutes. They start tolling together. At what interval of time will they toll together again :
A. 3 hr
B. $11 / 2 \mathrm{hr}$
C. $21 / 2 \mathrm{hr}$
D. 1 hr
67. The value of $9^{\frac{1}{3}}, 9^{\frac{1}{9}}, \ldots, \infty$
A. 3
B. 6
C. 9
D. None of these
68. Consider a vocabulary with only four propositions $A, B, C$ and $D$. How many models are there for the sentence B V C
A. 22
B. 12
C. 15
D. 16
69. What is the inverse of the function $y=5^{\log x}$ ?
A. $x=5^{1 / \log y}$
B. $x=y^{1 / \log 5}$
C. $x=5^{\log y}$
D. None of these
70. In a GP of positive terms, if every term is equal to the sum of next two terms, then find the common ratio of the GP
A. $2 \sin 18^{\circ}$
B. $2 \sin 72^{\circ}$
C. $2 \cos 11^{\circ}$
D. $2 \cos 66^{\circ}$
71. Let $A^{-1}=\left[\begin{array}{lll}1 & 2 & 3 \\ 2 & 4 & 3 \\ 3 & 1 & 6\end{array}\right]=\frac{\operatorname{adj}(A)}{k}$, then find $k$
A. -25
B. -15
C. $-\frac{1}{15}$
D. 144
72. Let $f(x)=x^{2}, g(x)=\tan x, h(x)=\ln x$ What is $[f \circ(f \circ f)](2)$ ?
A. 2
B. 8
C. 16
D. 256
73. Let $A$ be a $3 \times 3$ matrix and $B$ be its adjoint matrix. If $|B|=64$, then $|A|=$ ?
A. $\pm 2$
B. $\pm 4$
C. $\pm 8$
D. $\pm 12$
74. Let $A=\frac{1^{55}+2^{55}+3^{55}+4^{55}}{3}, B=\frac{1^{55}+3^{55}}{4}, C=\frac{2^{55}+4^{55}}{2}$ then
A. $B<A>C$
B. $A>B<C$
C. $B>C>A$
D. None of these
75. The solution of the equation $(x+1)(x+3)(x+2)(x+4)=120$ is
A. -1
B. 2
C. 1
D. 0
76. Find the number of ways of arranging the letters of the word "MATERIAL" such that all the vowels in the word are to come together?
A. 720
B. 1440
C. 1860
D. 2120
77. If $\log 2, \log \left(2^{x}-1\right)$ and $\log \left(2^{x}+3\right)$ are in AP then the value of $x$ is
A. $5 / 2$
B. $\log _{2} 5$
C. $\log _{5} 2$
D. $\log _{3} 5$
78. If $y=\ln \left(e^{x} \cdot \ln x\right)$, then $y^{\prime}=$ ?
A. 1
B. $1+1 / x$
C. $\frac{1}{x} e^{x}$
D. $\ln e^{x}$
79. The area bounded by the lines $y=|x|-2$ and $y=1-|x-1|$ is
A. 4 square units
B. 6 square units
C. 2 square units
D. 8 square units
80. Consider a vocabulary with only four propositions $A, B, C$ and $D$. How many models are there for the following sentence $B \vee C$.
A. 10
B. 12
C. 15
D. 16
81. For any two sets $A$ and $B, A-(A-B)=$ ?
A. $B$
B. $A-B$
C. $A \cap B$
D. $A^{C} \cap B^{C}$
82. What is the time 100 hrs after 7 am?
A. 7 pm
B. 12 am
C. 11 am
D. 6 pm
83. The geometric mean of the sequence $1,2,4,8, \ldots, 2^{n}$ :
A. $2^{n / 2}$
B. $2^{(n+1) / 2}$
C. $2^{(n+1)-1}$
D. $2^{(n-1)}$
84. The value of $n$ for which $\frac{a^{n+1}+b^{n+1}}{a^{n}+b^{n}}$ is a AM of $a$ and $b$ is
A. -1
B. 0
C. 1
D. $1 / 2$
85. If $x$ and $y$ are prime numbers which of the following CANNOT be the sum of $x$ and $y$ ?
A. 5
B. 9
C. 16
D. 23
86. If $u$ is a positive integer and $v$ is an even prime number, which of the following can be the GCD of $20 u$ and $6 v$ ?
A. 2
B. 4
C. 6
D. 20
87. $\int \frac{1}{\sqrt{16-25 x^{2}}} d x=$
A. $\sin ^{-1}\left(\frac{5 x}{4}\right)+c$
B. $\frac{1}{5} \sin ^{-1}(x / 4)+c$
C. $\frac{1}{5} \sin ^{-1}(4 / x)+c$
D. None of these
88. If $A=\{a, b, p\}, B=\{2,3\}$ and $C=\{p, q, r, s\}$, then $n[(A \cup C) \times B]$ is
A. 8
B. 20
C. 12
D. 16
89. If we roll a six-faced dice large number of times, the what would be the mean values of its outcome?
A. 2.4
B. 4.9
C. 3.5
D. 5.9
90. If $A=(x: x$ is an odd natural number $)$ and $B=(x: x$ is a prime number $)$, then $A \cap B$ is
A. the set odd natural numbers
B. the set prime numbers
C. the set of odd prime numbers
D. none of these
91. What is the number of subsets of set containing 5 elements?
A. 32
B. 8
C. 6
D. other than above
92. The number of subsets of $A=\{0,1,2\}$ is
A. 3
B. 6
C. 8
D. None of these
93. Find the greatest number that will divide 43,91 and 183 so as to leave the same reminder in each case
A. 4
B. 7
C. 9
D. 3
94. If $a$ is a simple constant, what is the derivative of $y=x^{a}$
A. $a x^{a-1}$
B. $(a-1)^{x}$
C. $a x+4$
D. None of above
95. If $H$ is the harmonic mean of $P$ and $Q$, then the value of $\frac{H}{P}-\frac{H}{Q}$
A. 4
B. $P$
C. 2
D. $P Q$
96. If $\phi(x)=a^{x}$, then $\left\lfloor\phi(p)^{3}\right\rfloor$ is
A. $\phi(3 p)$
B. $3 \phi(p)$
C. $5 \phi(p)$
D. $p$
97. If $2 f(x)+f\left(\frac{1}{x}\right)=\log x$, for all $x>0$, then $f\left(e^{x}\right)$ is
A. $x^{2}$
B. $x$
C. $2 x$
D. $6 x$
98. Consider a group of 73 persons. Then which of the following is necessarily true?
A. At least 10 persons were born in the same month
B. At least two months should have 7 persons born in
C. At least one month should have 7 persons born in
D. None of these
99. How many words with seven letters are there that starts with a vowel and end with an $A$ ?
A. 45087902
B. 6438677788
C. 456789023
D. 59406880
100. In course, a professor gives five grades $\{A, B, C, E, F\}$. What is the minimum number of students required so that four of them are guaranteed to get the same grade?
A. 8
B. 23
C. 16
D. None of these

## ANSWER SHEET

|  | A | B | C | D | E | 26 | A |  | B | C D |  | E |  | A | A B | C | D |  |  |  | 6 | A B | C | D | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | A | B | C | D | E | 27 | A | A ${ }^{\text {B }}$ | B | C D | D | E | 52 | A | A B | C | D |  | E | 77 | A | A B | C | D | E |
| 3 | A | B | C | D | E | 8 | A | A | B | C D | D | E | 53 | A | A B | C | D |  | E | 78 | A | A B | C | D | E |
| 4 | A | B | C | D | E | 9 | A |  | B | C D | D | E | 4 | A | A B | C | D | D | E |  | A | A B | C | D | D |
| 5 | A | B | C | D | E | 30 | A |  | B | C D | D | E | 5 | A | A B | C | D |  | E |  | A | A B | C | D | E |
| 6 | A | B | C | D | E | 31 | A | A | B $C$ | C D | D | E | , | A | A B | C | D | D | E | 81 | A | A B | C | D | E |
| 7 | A | B | C | D | E | 32 | A | A | B $C$ | C D | D | E |  | A | B | C | D | D |  |  | 2 | A B | C | D | E |
| 8 | A | B | C | D | E | 3 | A | A | B | C D | D | E |  | A | B | C | D | D |  |  | A | A | C | D | E |
| $9$ | A | B | C | D | E | 34 | A | B | B | C D |  | E |  | A | B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C D | D | E | 35 | A |  | B $C$ | C D | D | E |  | A | A B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C | D | E | 36 | A | B | B $C$ | C D | D | E |  | A | A B | C | D |  |  |  | A | A B | C | D | D |
|  | A | B | C | D | E | 37 | A | A | B | C D |  | E | 62 | A | A B | C | D |  |  |  | A | A B | C | D | E |
|  | A | B | C | D | E | 38 | A | B | B ${ }^{\text {C }}$ | C D |  | E | 63 | A | A B | C | D |  |  | 88 | A | A B | C | D | E |
|  | A | B | C | D | E | 39 | A | B | B | C D |  | E | 64 | A | A B | C | D | D | E | 89 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | $B$ | C D |  | E |  | A | A B | C | D | D |  | 90 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B | C D |  | E |  | A | A B | C | D | D |  |  | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B C | C D |  | E |  | A | A B | C | D | - | E | 92 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A B | C | D | D | E | 93 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A B | C | D |  | E |  |  | A B | C | D | E |
|  | A | B | C | D | E |  |  |  | B C | C D |  | E |  | A | A $\mathrm{B}^{\prime}$ | C | D |  |  | 95 |  | A B | C | D | E |
|  | A | B | C | D | E | 46 |  |  | B C | C D |  | E |  | A | A B | C | D |  |  | 96 |  | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B | C D |  | E |  | A | A B | C | D |  |  | 97 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A |  | B | C D |  | E |  | A | A $\mathrm{B}^{\prime}$ | C | D |  |  | 98 | A | A B | C | D | E |
|  | A | B | C | D | E |  | A | B | B C | C D |  | E |  | A | A B | C | D |  |  | 99 | A | A B | C | D | E |
|  | A | B | C | D | E |  |  |  | B C | C D |  | E |  |  | A ${ }^{\text {B }}$ | C | D |  |  |  | 0 | A B | C | D | E |

