

National Testing Agency

Question Paper Name :	Discrete Mathematics 30 Sep 2020 Shift 1
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Display Marks:	Yes

Discrete Mathematics

Group Number :	1
Group Id :	899514215
Group Maximum Duration :	0
Group Minimum Duration :	120
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	100
Is this Group for Examiner? :	No

Discrete Mathematics

Section Id :	899514295
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	100
Number of Questions to be attempted :	100

Section Marks : 100
Mark As Answered Required? : Yes
Sub-Section Number : 1
Sub-Section Id : 899514350
Question Shuffling Allowed : Yes

Question Number : 1 Question Id : 89951418405 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

In the poset $(P(\{a, b, c\}), \subseteq)$, the number of subsets non comparable to $\{a\}$ is

1. 4
2. 3
3. 2
4. 1

Options :

89951471998. 1
89951471999. 2
89951472000. 3
89951472001. 4

Question Number : 2 Question Id : 89951418406 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

Which of the following is not a Logical Statement ?

1. $2 \times 3 = 8$.
2. India and Pakistan are not neighboring countries.
3. It is very hot, today.
4. Every English word includes the alphabet e.

Options :

89951472002. 1
89951472003. 2
89951472004. 3
89951472005. 4

Question Number : 3 Question Id : 89951418407 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Among the relations 'not equal to' and 'less than' defined on the set Z of integers

1. Both are partially ordered
2. Only the first one is partially ordered
3. Only the second one is partially ordered
4. Both are not partially ordered

Options :

89951472006. 1

89951472007. 2

89951472008. 3

89951472009. 4

Question Number : 4 Question Id : 89951418408 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

For the statement $p \Rightarrow q$, the statement $q \Rightarrow p$ is called the

1. converse
2. contrapositive
3. negation
4. premise

Options :

89951472010. 1

89951472011. 2

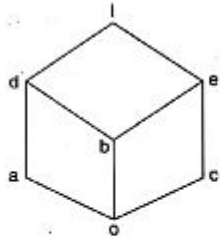
89951472012. 3

89951472013. 4

Question Number : 5 Question Id : 89951418409 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The lattice given below is



1. Complemented and distributive
2. Distributive but not complemented
3. Complemented but not distributive
4. Neither distributive nor complemented

Options :

89951472014. 1
89951472015. 2
89951472016. 3
89951472017. 4

Question Number : 6 Question Id : 89951418410 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the lattice $\{1, 2, 4, 5, 10, 20\}$ with the relation 'divisibility', the complement of 10 is

1. 2
2. 4
3. 5
4. does not exist

Options :

89951472018. 1
89951472019. 2
89951472020. 3
89951472021. 4

Question Number : 7 Question Id : 89951418411 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A, B are subsets of a universal set having 12 elements. If A has 7 elements, B has 9 elements and $A \cap B$ has 6 elements, then what is the number of elements in

$A \cup B$?

1. 7
2. 8
3. 9
4. 10

Options :

89951472022. 1
89951472023. 2
89951472024. 3
89951472025. 4

Question Number : 8 Question Id : 89951418412 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If L_1 and L_2 are two languages, which of the following need not be a language ?

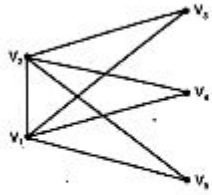
1. $L_1 \cup L_2$
2. $L_1 \cap L_2$
3. $L_1 - L_2$
4. None of these

Options :

89951472026. 1
89951472027. 2
89951472028. 3
89951472029. 4

Question Number : 9 Question Id : 89951418413 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The given graph is



1. Eulerian and Hamiltonian
2. Eulerian but not Hamiltonian
3. Not Eulerian but Hamiltonian
4. neither Eulerian nor Hamiltonian

Options :

89951472030. 1
89951472031. 2
89951472032. 3
89951472033. 4

Question Number : 10 Question Id : 89951418414 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The solution of the recurrence relation $a_n = 4(a_{n-1} - a_{n-2})$ with the initial conditions $a_0 = a_1 = 1$

is

1. $(1-n)2^n$
2. $(1-\frac{1}{2}n)2^n$
3. $(1+n)2^n$
4. $(1+\frac{1}{2}n)2^n$

Options :

89951472034. 1
89951472035. 2
89951472036. 3
89951472037. 4

Question Number : 11 Question Id : 89951418415 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

Considering the English language as a formal language, any alphabet

1. is a terminal
2. is a non-terminal
3. is a production
4. can be taken as the starting symbol

Options :

89951472038. 1
89951472039. 2
89951472040. 3
89951472041. 4

Question Number : 12 Question Id : 89951418416 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

What is the cardinality of the power set of the set

$\{0, 1, 2, 3\}$?

1. 8
2. 6
3. 16
4. 18

Options :

89951472042. 1
89951472043. 2
89951472044. 3
89951472045. 4

Question Number : 13 Question Id : 89951418417 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

If the function $f: Z_5 \rightarrow Z_5$ is defined by $f(x) = 2x$ then $f^{-1}(3)$ is

1. 4
2. 3
3. 2
4. 1

Options :

- 89951472046. 1
- 89951472047. 2
- 89951472048. 3
- 89951472049. 4

Question Number : 14 Question Id : 89951418418 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the function $f: Z \times Z \rightarrow Z$ is not onto?

- 1. $f(a, b) = a + b$
- 2. $f(a, b) = a$
- 3. $f(a, b) = |b|$
- 4. $f(a, b) = a - b$

Options :

- 89951472050. 1
- 89951472051. 2
- 89951472052. 3
- 89951472053. 4

Question Number : 15 Question Id : 89951418419 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If a ring $(R, +, \cdot)$ is such that $a^3 = a, \forall a \in R$ then R is called a

- 1. Integral domain
- 2. Division ring
- 3. Commutative ring
- 4. Field

Options :

- 89951472054. 1
- 89951472055. 2
- 89951472056. 3
- 89951472057. 4

Question Number : 16 Question Id : 89951418420 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The function $\frac{2}{1-2x} + \frac{1}{1-x}$ generates the sequence $\{a_n\}$ where a_n is

1. $2^{n+1} + 1$
2. $2^n + 1$
3. $2^{n+1} - 1$
4. $2^n - 1$

Options :

89951472058. 1
89951472059. 2
89951472060. 3
89951472061. 4

Question Number : 17 Question Id : 89951418421 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

When an input electrical signal $A=10100$ is applied to a NOT gate, its output signal is

1. 10100
2. 01011
3. 00000
4. 11111

Options :

89951472062. 1
89951472063. 2
89951472064. 3
89951472065. 4

Question Number : 18 Question Id : 89951418422 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

What is the range of the function $f(x) = x^{-1}$ which is defined everywhere on its domain?

1. $(-\infty, \infty)$
2. $(-\infty, \infty) - \{0\}$
3. $[0, \infty)$
4. $(0, \infty)$

Options :

- 89951472066. 1
- 89951472067. 2
- 89951472068. 3
- 89951472069. 4

Question Number : 19 Question Id : 89951418423 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

A function is defined by the mapping $f: A \rightarrow B$ such that A contains m elements and B contains n elements with $m \leq n$, then the number of one-one functions are

- 1. 0
- 2. ${}^nC_m \cdot n!$
- 3. ${}^nC_m \cdot m!$
- 4. mn

Options :

- 89951472070. 1
- 89951472071. 2
- 89951472072. 3
- 89951472073. 4

Question Number : 20 Question Id : 89951418424 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The relation R on the set of integers Z defined by $R = \{(x, y) : x \leq y + 1\}$ is

- 1. symmetric
- 2. transitive
- 3. reflexive and transitive
- 4. reflexive

Options :

- 89951472074. 1
- 89951472075. 2
- 89951472076. 3
- 89951472077. 4

Question Number : 21 Question Id : 89951418425 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

If the set A has 3 elements and set B has 4 elements, then how many no. of injections are there from set A to B ?

1. 12
2. 24
3. 36
4. 48

Options :

89951472078. 1
89951472079. 2
89951472080. 3
89951472081. 4

Question Number : 22 Question Id : 89951418426 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

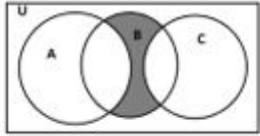
Which of the following rings are integral domains? I) Z_{60} II) Z_{71} III) Z_{82} IV) Z_{97}

1. I and II
2. II and III
3. II and IV
4. III and IV

Options :

89951472082. 1
89951472083. 2
89951472084. 3
89951472085. 4

Question Number : 23 Question Id : 89951418427 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0



The shaded area of the figure is best described by

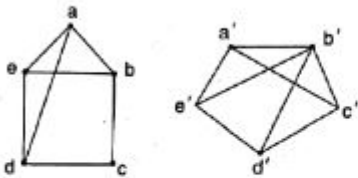
1. A'
2. $B - (A \cap B) - (C \cap B)$
3. $A \cap B \cap C$
4. $(A \cap B) - (B \cap C)$

Options :

89951472086. 1
 89951472087. 2
 89951472088. 3
 89951472089. 4

Question Number : 24 Question Id : 89951418428 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The given graphs are isomorphic.



1. True
2. False
3. the no. of edges are different
4. the degrees of the vertices are the same

Options :

89951472090. 1
 89951472091. 2
 89951472092. 3
 89951472093. 4

Question Number : 25 Question Id : 89951418429 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let the students who likes Mathematics be 12, the ones who like Physics 10, those who like only Mathematics are 6, then how many students like only Physics , assuming there are total of 16 students.

1. 16
2. 8
3. 4
4. 10

Options :

89951472094. 1
89951472095. 2
89951472096. 3
89951472097. 4

Question Number : 26 Question Id : 89951418430 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The output of a two input NAND gate is 0 only when its

1. both inputs are 0
2. both inputs are 1
3. either input is 1
4. None of the options

Options :

89951472098. 1
89951472099. 2
89951472100. 3
89951472101. 4

Question Number : 27 Question Id : 89951418431 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The bit strings for the sets are 1111100000 and 1010101010. The union of these sets is

1. 1010100000
2. 1010101101
3. 1111111100
4. 1111101010

Options :

- 89951472102. 1
- 89951472103. 2
- 89951472104. 3
- 89951472105. 4

Question Number : 28 Question Id : 89951418432 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If A is any statement and p is a proposition, $\neg (A \vee p) \wedge (A \wedge p)$ is a

- 1. Tautology
- 2. Contingency
- 3. Contradiction
- 4. All of the options

Options :

- 89951472106. 1
- 89951472107. 2
- 89951472108. 3
- 89951472109. 4

Question Number : 29 Question Id : 89951418433 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

What is the converse of the conditional statement "If it rain today, I will play tomorrow"

- 1. "I will play tomorrow only if it rain today."
- 2. "If I do not play tomorrow, then it will not have rain today."
- 3. "If it does not rain today, then I will not play tomorrow."
- 4. "I will not play tomorrow only if it rain today."

Options :

- 89951472110. 1
- 89951472111. 2
- 89951472112. 3
- 89951472113. 4

Question Number : 30 Question Id : 89951418434 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

If $G(x)$ is the generating function for the sequence $a_0, a_1, a_2, \dots$ then $\frac{G(x) - a_0}{x}$ is the generating function of

1. $a_1, a_2, a_3, \dots$
2. $a_2, a_3, a_4, \dots$
3. $0, a_0, a_1, \dots$
4. $0, a_1, a_2, \dots$

Options :

89951472114. 1
89951472115. 2
89951472116. 3
89951472117. 4

Question Number : 31 Question Id : 89951418435 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

What are the inverse of the conditional statement "If you make your notes, it will be a convenient in exams."

1. "If you make notes, then it will be a convenient in exams."
2. "If you do not make notes, then it will not be a convenient in exams."
3. "If it will not be a convenient in exams, then you did not make your notes."
4. "If it will be a convenient in exams, then you make your notes."

Options :

89951472118. 1
89951472119. 2
89951472120. 3
89951472121. 4

Question Number : 32 Question Id : 89951418436 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

$p \rightarrow q$ is logical equivalent to

1. $p \vee \sim q$
2. $\sim p \vee \sim q$
3. $\sim p \vee q$
4. $\sim p \wedge q$

Options :

89951472122. 1
89951472123. 2
89951472124. 3
89951472125. 4

Question Number : 33 Question Id : 89951418437 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The sequence corresponding to the generating function $(2+x)^3$ is

1. (6, 12, 8, 1, 0, 0, 0, ...)
2. (8, 12, 6, 1, 0, 0, 0, ...)
3. (0, 0, 0, 8, 12, 6, ...)
4. (1, 8, 12, 6, 0, 0, 0, ...)

Options :

89951472126. 1
89951472127. 2
89951472128. 3
89951472129. 4

Question Number : 34 Question Id : 89951418438 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of different ways of answering a test with six questions each having four multiple choices is

1. 24
2. ${}^6_4P$
3. 6^4
4. 4^6

Options :

- 89951472130. 1
- 89951472131. 2
- 89951472132. 3
- 89951472133. 4

Question Number : 35 Question Id : 89951418439 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

For any two real numbers θ and ϕ , we define $\theta R \phi$ if and only if $\sec^2 \theta - \tan^2 \phi = 1$. Then R is

- 1. Reflexive
- 2. Symmetric
- 3. Transitive
- 4. All of the options

Options :

- 89951472134. 1
- 89951472135. 2
- 89951472136. 3
- 89951472137. 4

Question Number : 36 Question Id : 89951418440 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $S = \{p + q\sqrt{2}; p, q \in \mathbb{Q}\}$. If '+' and '□' are the usual operations of addition and multiplication of real numbers, then $(S, +, \square)$ is

- 1. not a commutative ring
- 2. a commutative ring but not an integral domain
- 3. an integral domain but not a field
- 4. a field

Options :

- 89951472138. 1
- 89951472139. 2
- 89951472140. 3
- 89951472141. 4

Question Number : 37 Question Id : 89951418441 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

The Euler's formula for planar graphs is

1. $v + e - f = 2$
2. $v - e + f = 2$
3. $v - e - f = 2$
4. $v = e + f - 2$

Options :

89951472142. 1
89951472143. 2
89951472144. 3
89951472145. 4

Question Number : 38 Question Id : 89951418442 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

Polyhedral is.... ?

1. A simple connected graph
2. A plane graph
3. A graph in which the degree of every vertex and every face is at least 3
4. All of these

Options :

89951472146. 1
89951472147. 2
89951472148. 3
89951472149. 4

Question Number : 39 Question Id : 89951418443 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

Among the integers from 1 to 300, how many are divisible by 3, but not by 5 nor by 7?

1. 100
2. 14
3. 68
4. 138

Options :

89951472150. 1
89951472151. 2
89951472152. 3
89951472153. 4

Question Number : 40 Question Id : 89951418444 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The chromatic number of the following graph with 7 vertices is



1. 6
2. 5
3. 4
4. 3

Options :

89951472154. 1
89951472155. 2
89951472156. 3
89951472157. 4

Question Number : 41 Question Id : 89951418445 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

How many edges are there in a forest of t trees containing a total of n vertices

1. n
2. t
3. $n+t$
4. $n-t$

Options :

89951472158. 1
89951472159. 2
89951472160. 3
89951472161. 4

Question Number : 42 Question Id : 89951418446 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The question paper of Discrete Mathematics contains ten questions divided into two groups of five questions each. In how many ways can a candidate answer six questions taking at least two questions from each group.

1. 50
2. 100
3. 150
4. 200

Options :

89951472162. 1
89951472163. 2
89951472164. 3
89951472165. 4

Question Number : 43 Question Id : 89951418447 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A connected planar graph has an equal number of vertices and faces. If there are 20 edges in this graph, the number of vertices must be:

1. 9
2. 10
3. 11
4. 20

Options :

89951472166. 1
89951472167. 2
89951472168. 3
89951472169. 4

Question Number : 44 Question Id : 89951418448 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A full m-ary tree with i internal vertices contain how many leaves?

1. $(m-1)i+1$
2. $(m+1)i-1$
3. $(m-i)+1$
4. $(m-1)i-1$

Options :

89951472170. 1
89951472171. 2
89951472172. 3
89951472173. 4

Question Number : 45 Question Id : 89951418449 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The generating function of the sequence $a_n = \begin{cases} 2^n, & \text{if } n \text{ is even} \\ 2^{-n}, & \text{if } n \text{ is odd} \end{cases}$ is

1. $\frac{2}{1+x}$
2. $\frac{1}{1+2x}$
3. $\frac{1}{1-2x}$
4. $\frac{2}{1-x}$

Options :

89951472174. 1
89951472175. 2
89951472176. 3
89951472177. 4

Question Number : 46 Question Id : 89951418450 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $A = \{0, 11\}$ and $B = \{1, 10, 110\}$. Then which of following is an element of BA ?

1. 11011
2. 10111
3. 11001
4. 11001

Options :

89951472178. 1
89951472179. 2
89951472180. 3
89951472181. 4

Question Number : 47 Question Id : 89951418451 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A particular solution of the linear non-homogeneous recurrence relation $a_n = 6a_{n-1} - 9a_{n-2} + 3^n$ is

(a) 0 (b) $(p_0 + p_1 n) 3^n$ (c) $p_0 n^2 3^n$ (d) $p_0 n^3 3^n$

1. $p_0 3^n$
2. $(p_0 + p_1 n) 3^n$
3. $p_0 n^2 3^n$
4. $p_0 n^3 3^n$

Options :

89951472182. 1
89951472183. 2
89951472184. 3
89951472185. 4

Question Number : 48 Question Id : 89951418452 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of subgroups of a cyclic group with 100 elements is

1. 2
2. 5
3. 9
4. 10

Options :

89951472186. 1
89951472187. 2
89951472188. 3
89951472189. 4

Question Number : 49 Question Id : 89951418453 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If $f(x)$ and $g(x)$ are generating functions for the finite sequences a and b respectively, then $f(x) * g(x)$ is the generating function for

1. $a * b$
2. a/b
3. $a + b$
4. ab

Options :

89951472190. 1
89951472191. 2
89951472192. 3
89951472193. 4

Question Number : 50 Question Id : 89951418454 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In how many ways can a group of 4 boys and 4 girls be seated in a circular table so that no 2 boys are adjacent?

1. 6
2. 24
3. 144
4. 36

Options :

89951472194. 1
89951472195. 2
89951472196. 3
89951472197. 4

Question Number : 51 Question Id : 89951418455 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The order of $[3]$ in Z_5 is

1. 5
2. 3
3. 10
4. 1

Options :

- 89951472198. 1
- 89951472199. 2
- 89951472200. 3
- 89951472201. 4

Question Number : 52 Question Id : 89951418456 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The language generated by the grammar whose production rules are $\{S \rightarrow bS, S \rightarrow bA, A \rightarrow bA, A \rightarrow b\}$ is

- 1. $L = \{b^n ab^m : n \geq 0, m \geq 0\}$
- 2. $L = \{b^n ab^n : n \geq 0\}$
- 3. $L = \{a^n ba^m : n \geq 0, m \geq 0\}$
- 4. $L = \{a^n ba^n : n \geq 0\}$

Options :

- 89951472202. 1
- 89951472203. 2
- 89951472204. 3
- 89951472205. 4

Question Number : 53 Question Id : 89951418457 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following is not a ring?

- 1. $n\mathbb{Z}$ with usual addition and multiplication.
- 2. $\mathbb{Z}^+$ with usual addition and multiplication
- 3. $\mathbb{Z} \times \mathbb{Z}$ with addition and multiplication by components
- 4. $\{a + b\sqrt{2} : a, b \in \mathbb{Z}\}$ with usual addition and multiplication

Options :

- 89951472206. 1
- 89951472207. 2
- 89951472208. 3

Question Number : 54 Question Id : 89951418458 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A Boolean algebra contains _____ no. of elements (for any n in $\mathbb{Z}^+$)

1. 2^n
2. $2n$
3. n
4. $2/n$

Options :

89951472210. 1
89951472211. 2
89951472212. 3
89951472213. 4

Question Number : 55 Question Id : 89951418459 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The given transition diagram of a Finite Automata recognizes the language



1. $L = \{0^{n+1} : n \geq 0\}$
2. $L = \{0^n : n \geq 0\}$
3. $L = \{0^{2n} : n > 0\}$
4. $L = \{0^{n+1} : n > 1\}$

Options :

89951472214. 1
89951472215. 2
89951472216. 3
89951472217. 4

Question Number : 56 Question Id : 89951418460 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

For which values of Boolean variables x, y, z does $x + y + z = xyz$

1. (0, 1, 1)
2. (0, 0, 1) & (1, 0, 0)
3. (1, 1, 0)
4. (1, 1, 1) & (0, 0, 0)

Options :

89951472218. 1
89951472219. 2
89951472220. 3
89951472221. 4

Question Number : 57 Question Id : 89951418461 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

How many students must be there in a class to guarantee that at least 5 them receive the same score in an exam which is graded on the scale from 0 to 25 points?

1. 105
2. 101
3. 125
4. 126

Options :

89951472222. 1
89951472223. 2
89951472224. 3
89951472225. 4

Question Number : 58 Question Id : 89951418462 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

The dual of $\bar{x} \bar{y}$ is

1. $\bar{x} + \bar{y}$
2. $x + y$
3. xy
4. $\overline{x + y}$

Options :

89951472226. 1
89951472227. 2
89951472228. 3
89951472229. 4

Question Number : 59 Question Id : 89951418463 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The operation which is commutative but not associative

1. AND
2. EX_NOR
3. OR
4. NAND

Options :

89951472230. 1
89951472231. 2
89951472232. 3
89951472233. 4

Question Number : 60 Question Id : 89951418464 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If a cyclic group G contains 11 distinct elements, then it has how many generators?

1. 2
2. 7
3. 9
4. 10

Options :

89951472234. 1

89951472235. 2

89951472236. 3

89951472237. 4

Question Number : 61 Question Id : 89951418465 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

How many edges must be removed to produce the spanning forest of a graph with n vertices, m edges, and c connected components?

1. $m - n + c$
2. $m - n$
3. $m + n - c$
4. $m + n$

Options :

89951472238. 1

89951472239. 2

89951472240. 3

89951472241. 4

Question Number : 62 Question Id : 89951418466 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A Boolean product of the Boolean variables x , y , and z , or their complements that has value 1 if and only if $x = y = 0, z = 1$ is

1. $\bar{x} \bar{y} z$
2. $xy \bar{z}$
3. $x \bar{y} z$
4. $x \bar{y} \bar{z}$

Options :

89951472242. 1

89951472243. 2

89951472244. 3

89951472245. 4

Question Number : 63 Question Id : 89951418467 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Consider the set $A = \{1, 2, 3, 4\}$ with the relation $R = \{(1,1), (2,1), (2,2), (3,1), (3,3), (3,4), (4,4)\}$

The greatest and least element of this poset are respectively

1. 1, 4
2. 3, 2
3. 2, 4
4. doesn't exist

Options :

89951472246. 1
89951472247. 2
89951472248. 3
89951472249. 4

Question Number : 64 Question Id : 89951418468 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

How many cells does a K-map in six variables have?

1. 8
2. 16
3. 64
4. 32

Options :

89951472250. 1
89951472251. 2
89951472252. 3
89951472253. 4

Question Number : 65 Question Id : 89951418469 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Index of a subgroup is 5 and its order is 3. The order of the group is

1. 3
2. 5
3. 15
4. 8

Options :

89951472254. 1
89951472255. 2
89951472256. 3
89951472257. 4

Question Number : 66 Question Id : 89951418470 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In a K-map for a function in two variables put 1 in the cell representing $\bar{x}y$. What are the minterms represented by cells adjacent to this cell?

1. $x\bar{y}$ and $\bar{x}\bar{y}$
2. xy and $x\bar{y}$
3. $x\bar{y}$ and $\bar{x}y$
4. xy and $\bar{x}\bar{y}$

Options :

89951472258. 1
89951472259. 2
89951472260. 3
89951472261. 4

Question Number : 67 Question Id : 89951418471 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $A = \{1, 2, 3, 4\}$ and R is a relation on A whose matrix is $M_R = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

Then R is

1. Reflexive but not symmetric
2. Symmetric but not reflexive
3. Reflexive and symmetric
4. Neither reflexive nor symmetric

Options :

89951472262. 1
 89951472263. 2
 89951472264. 3
 89951472265. 4

Question Number : 68 Question Id : 89951418472 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which of the following binary operation gives group structure on the given set

1. $a * b = ab$ on $\mathbb{Z}$
2. $a * b = a + b$ on $2\mathbb{Z}$
3. $a * b = \sqrt{ab}$ on $\mathbb{R}$
4. $a * b = ab$ on $\mathbb{Q}$

Options :

89951472266. 1
 89951472267. 2
 89951472268. 3
 89951472269. 4

Question Number : 69 Question Id : 89951418473 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $(G, *)$ is a group where the binary operation $*$ is defined as $a * b = a + b + 3, \forall a, b \in G$.

Then the inverse of $a \in G$ is given by

1. $-3 - a$
2. $3 - a$
3. $6 - a$
4. $-6 - a$

Options :

89951472270. 1

89951472271. 2

89951472272. 3

89951472273. 4

Question Number : 70 Question Id : 89951418474 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The least number of computers required to connect 10 computers to 5 routers to guarantee 5 computers can directly access 5 routers is

1. 74
2. 104
3. 30
4. 67

Options :

89951472274. 1

89951472275. 2

89951472276. 3

89951472277. 4

Question Number : 71 Question Id : 89951418475 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Find the value of a_4 for the recurrence relation $a_n = 2a_{n-1} + 3$ with $a_0 = 6$.

1. 320
2. 221
3. 141
4. 65

Options :

- 89951472278. 1
- 89951472279. 2
- 89951472280. 3
- 89951472281. 4

Question Number : 72 Question Id : 89951418476 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The generating function for the generating series 1, 2, 3, 4, 5, ...

- 1. $\frac{2}{1-3x}$
- 2. $\frac{1}{1+x}$
- 3. $\frac{1}{(1-x)^2}$
- 4. $\frac{1}{1-x^2}$

Options :

- 89951472282. 1
- 89951472283. 2
- 89951472284. 3
- 89951472285. 4

Question Number : 73 Question Id : 89951418477 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The particular solution of the recurrence relation $a_n + 5a_{n-1} + 6a_{n-2} = 3n^2$ is

- 1. $\frac{1}{4}n^2 + \frac{17}{24}n + \frac{115}{288}$
- 2. $\frac{17}{24}n^2 + \frac{1}{4}n + \frac{115}{288}$
- 3. $\frac{1}{4}n^2 + \frac{17}{24}n$
- 4. $\frac{1}{4}n^2 + \frac{17}{24}n + \frac{115}{28}$

Options :

89951472286. 1
89951472287. 2
89951472288. 3
89951472289. 4

Question Number : 74 Question Id : 89951418478 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Consider the congruence $45 \equiv 3 \pmod{7}$. Find the set of equivalence class representatives.

1. $\{\dots, 0, 7, 14, 28, \dots\}$
2. $\{\dots, -3, 0, 6, 21, \dots\}$
3. $\{\dots, 0, 4, 8, 16, \dots\}$
4. $\{\dots, 3, 8, 15, 21, \dots\}$.

Options :

89951472290. 1
89951472291. 2
89951472292. 3
89951472293. 4

Question Number : 75 Question Id : 89951418479 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

For any two real numbers θ and ϕ , we define $\theta R \phi$ if and only if $\sec^2 \theta - \tan^2 \phi = 1$. Then R is

1. True
2. False
3. Data insufficient
4. Cannot say

Options :

89951472294. 1
89951472295. 2
89951472296. 3
89951472297. 4

Question Number : 76 Question Id : 89951418480 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

Determine the number of equivalence classes that can be described by the set $\{2, 4, 5\}$.

1. 125
2. 5
3. 16
4. 72

Options :

89951472298. 1
89951472299. 2
89951472300. 3
89951472301. 4

Question Number : 77 Question Id : 89951418481 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

The least integer n such that the function $f(n) = \frac{x^4 + x^2 + 1}{x^2 + 1}$ is $\theta(x^n)$ is

1. 1
2. 6
3. 4
4. 2

Options :

89951472302. 1
89951472303. 2
89951472304. 3
89951472305. 4

Question Number : 78 Question Id : 89951418482 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

For any positive integer m , _____ is divisible by 4.

1. $5m^2 + 2$
2. $3m + 1$
3. $m^2 + 3$
4. $m^3 + 3m$

Options :

89951472306. 1
89951472307. 2
89951472308. 3
89951472309. 4

Question Number : 79 Question Id : 89951418483 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If $f: \mathbb{R} \rightarrow \mathbb{R}$ defined by $f(x) = \begin{cases} 3x-4, & x > 0 \\ -3x+2, & x \leq 0 \end{cases}$ then $f^{-1}(2)$ is

1. $\{0\}$
2. $\{2\}$
3. $\{0, 2\}$
4. $\emptyset$

Options :

89951472310. 1
89951472311. 2
89951472312. 3
89951472313. 4

Question Number : 80 Question Id : 89951418484 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If ${}^{23}C_{r+2} = {}^{23}C_{3r+1}$, then the value of r is

1. 7
2. 3
3. 5
4. 1

Options :

89951472314. 1
89951472315. 2
89951472316. 3
89951472317. 4

Question Number : 81 Question Id : 89951418485 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The type of grammar which consists of the following productions is

$S \rightarrow aB, B \rightarrow bA, B \rightarrow b, B \rightarrow a, A \rightarrow aB, A \rightarrow a.$

1. Type 0
2. Type 1
3. Type 2
4. Type 3

Options :

89951472318. 1
89951472319. 2
89951472320. 3
89951472321. 4

Question Number : 82 Question Id : 89951418486 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Pairs of numbers representing respectively the number of vertices and number of edges in a graph are given. Choose the one that can not represent a simple graph.

1. (5, 120)
2. (6, 600)
3. (4, 25)
4. (7, 5000)

Options :

89951472322. 1
89951472323. 2
89951472324. 3
89951472325. 4

Question Number : 83 Question Id : 89951418487 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A connected planar graph with 10 edges and 5 regions has _____ no. of vertices.

1. 7
2. 8
3. 10
4. 5

Options :

89951472326. 1
89951472327. 2
89951472328. 3
89951472329. 4

Question Number : 84 Question Id : 89951418488 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

In the principle of mathematical induction, which of the following steps is mandatory?

1. induction hypothesis
2. inductive reference
3. induction set assumption
4. minimal set representation

Options :

- 89951472330. 1
- 89951472331. 2
- 89951472332. 3
- 89951472333. 4

Question Number : 85 Question Id : 89951418489 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

If each and every vertex in G has degree at most 23 then G can have a vertex coloring of _____

- 1. 54
- 2. 23
- 3. 176
- 4. 24

Options :

- 89951472334. 1
- 89951472335. 2
- 89951472336. 3
- 89951472337. 4

Question Number : 86 Question Id : 89951418490 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The number of internal vertices of a complete binary tree T is 12. Then the number of pedant vertices of T is

- 1. 11
- 2. 12
- 3. 13
- 4. 14

Options :

- 89951472338. 1
- 89951472339. 2
- 89951472340. 3
- 89951472341. 4

Question Number : 87 Question Id : 89951418491 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

There are four candidates A, B, C, D for president. Suppose A is twice as likely to be elected as B, B is three times as likely as C, and C and D are equally likely to be elected. What is the probability that the candidate C is elected?

1. $\frac{1}{11}$
2. $\frac{6}{11}$
3. $\frac{3}{11}$
4. $\frac{2}{11}$

Options :

89951472342. 1
89951472343. 2
89951472344. 3
89951472345. 4

Question Number : 88 Question Id : 89951418492 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

A bag contains 25 balls such as 10 balls are red, 7 are white and 8 are blue. What is the minimum number of balls that must be picked up from the bag blindfolded (without replacing any of it) to be assured of picking at least one ball of each colour?

1. 10
2. 18
3. 63
4. 35

Options :

89951472346. 1
89951472347. 2
89951472348. 3
89951472349. 4

Question Number : 89 Question Id : 89951418493 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

Which of the following sets under the relation 'divisibility' is a Boolean algebra?

1. D_{40}
2. D_{385}
3. D_{75}
4. D_{60}

Options :

89951472350. 1
89951472351. 2
89951472352. 3
89951472353. 4

Question Number : 90 Question Id : 89951418494 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

A function defined by $f(x) = 2 * x$ such that $f(x + y) = 2x + y$ under the group of real numbers, then

1. Association exists
2. Homomorphism exists
3. Heteromorphism exists
4. None of the options

Options :

89951472354. 1
89951472355. 2
89951472356. 3
89951472357. 4

Question Number : 91 Question Id : 89951418495 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

The solution of the recurrence relation $a_n - 5a_{n-1} = -6a_{n-2}$, $n \geq 0$, $a_0 = 2$, $a_1 = 5$ is

1. $2^n + 3^n$
2. $2^n - 3^n$
3. $-2^n + 3^n$
4. $-3^n - 2^n$

Options :

89951472358. 1
89951472359. 2
89951472360. 3
89951472361. 4

**Question Number : 92 Question Id : 89951418496 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0**

The number of pendant vertices in a binary tree with n vertices is

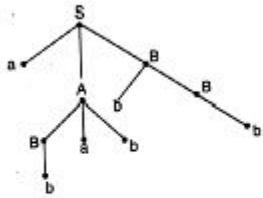
1. $\frac{n+1}{2}$
2. $\frac{n-1}{2}$
3. $\frac{n(n+1)}{2}$
4. $\frac{n}{2}$

Options :

89951472362. 1
89951472363. 2
89951472364. 3
89951472365. 4

**Question Number : 93 Question Id : 89951418497 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0**

The output string in the following derivation tree is



1. ababbbb
2. ababb
3. bbbaba
4. bbaba

Options :

89951472366. 1
89951472367. 2
89951472368. 3
89951472369. 4

Question Number : 94 Question Id : 89951418498 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The complexity of the function $\log(n!)$ is

1. $O(n^n)$
2. $O(\log n)$
3. $O(n^2)$
4. $O(n \log n)$

Options :

89951472370. 1
89951472371. 2
89951472372. 3
89951472373. 4

Question Number : 95 Question Id : 89951418499 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Let $(G, *)$ be a abelian monoid .The G is

1. Associative
2. Commutative
3. Identity exists
4. All these options

Options :

89951472374. 1

89951472375. 2

89951472376. 3

89951472377. 4

Question Number : 96 Question Id : 89951418500 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

The inverse of the permutation $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ is

1. $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{pmatrix}$
2. $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}$
3. $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$
4. $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 3 & 1 \end{pmatrix}$

Options :

89951472378. 1

89951472379. 2

89951472380. 3

89951472381. 4

Question Number : 97 Question Id : 89951418501 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No

Correct Marks : 1 Wrong Marks : 0

If L_1 context free language and L_2 is a regular language, which one of the following languages is false?

1. $L_1 - L_2$ is not context free
2. $-L_2$ is regular
3. $L_1 \cap L_2$ is context free
4. All of these options

Options :

89951472382. 1
89951472383. 2
89951472384. 3
89951472385. 4

Question Number : 98 Question Id : 89951418502 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

A cycle on n vertices is isomorphic to its complement. What is the value of n ?

1. 5
2. 32
3. 17
4. 8

Options :

89951472386. 1
89951472387. 2
89951472388. 3
89951472389. 4

Question Number : 99 Question Id : 89951418503 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No
Correct Marks : 1 Wrong Marks : 0

An element of a commutative ring $R(1 \neq 0)$ is nilpotent if

1. $a + 1 = 0$
2. $a^n = 0$, for some positive integer n
3. $a^n = 1$, for some integer n
4. $a^2 = 0$

Options :

89951472390. 1
89951472391. 2
89951472392. 3
89951472393. 4

Question Number : 100 Question Id : 89951418504 Question Type : MCQ Option Shuffling : No Is Question Mandatory : No Correct Marks : 1 Wrong Marks : 0

Which type of string is accepted by the given automata?

1. All strings ☒
2. No strings
3. Null string
4. None of these options

Options :

89951472394. 1
89951472395. 2
89951472396. 3
89951472397. 4