*

Set of all 2x2 non - singular matrices with real entries under matrix multiplication

(a) Doesn't form a group (b) forms an abelian group

(c) Forms a finite group (d) forms an infinite non-abelian group

- [ ] A
- [ ] B
- [ ] C
- [x] D

*

Subgroup of the group of real numbers under addition $(R, +)$ is

(a) $(Z,+)$

(b) $(Z^{+},+)$

(c) $(Q,\bullet)$

(d) $(R,-)$

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

In the cyclic group G={1,-1,i,-i} under multiplication it's generators are

a) {1,i}
b) {1,-i}
c) {-1,i}
d) {i,-i}

- ○ A
- ○ B
- ○ C
- ◉ D

*

In a permutation group S_3, if $p = \begin{pmatrix} a & b & c \\ b & c & a \end{pmatrix}$, then inverse of p is

(a) $\begin{pmatrix} a & b & c \\ c & a & b \end{pmatrix}$

(b) $\begin{pmatrix} a & b & c \\ a & c & b \end{pmatrix}$

(c) $\begin{pmatrix} a & b & c \\ b & c & a \end{pmatrix}$

(d) $\begin{pmatrix} a & b & c \\ b & a & c \end{pmatrix}$

- (•) A
- ( ) B
- ( ) C
- ( ) D

*

.In a permutation group if $P_1 = \begin{pmatrix} a & b \\ a & b \end{pmatrix}$ $P_2 = \begin{pmatrix} a & b \\ b & a \end{pmatrix}$ then $P_2 * P_1 =$

a) P_1

b) P_2

c) P_1^{-1}

d) P_2^{-1}

- [ ] A
- [x] B
- [ ] C
- [ ] D

*

If {G,*} is a finite cyclic group of order n with "a " as generator element, then ....is also a generator iff the GCD of (m,n)=1 where m < n.

a) a^m
b) a^n
c) a^{m+n}
d) b^{-1}

- (•) A
- ( ) B
- ( ) C
- ( ) D

*

'. The inverse of the element "a" in group (G,*) with binary operation a*b=a+b+2

a) – a (b) a^{-1} (c) – 2 (d) – (a+4)

- ( ) A
- ( ) B
- ( ) C
- (•) D

*

The order of the element –i in the group {1, -1,i,-i} under multiplication is

a) 1
b) 2
c) 3
d) 4

- (selected) A
- B
- C
- D

*

A cyclic group is ....

a) Subgroup

b) Abelian group

c) permutation group

d) Dihedral group

- A
- (selected) B
- C
- D

*

In a group, (G, *) for any a, b ε G, $(a*b)^{-1}$ = ...

a) $a^{-1} * b^{-1}$
b) $b^{-1} * a^{-1}$
c) a*b
d) b *a

- [ ] A
- [x] B
- [ ] C
- [ ] D

*

If *is the binary operation on the set R of real numbers defined by a *b = a+b+2ab, then the identity element is

a) 0

b) 1

c) 1+2a

d) 2a

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

The kernel of a homomorphism f from a group (G,*) to another group (G', Δ) is a .... of (G, *)

a) Empty subset of G
b) Subgroup of G
c) Abelian subgroup of G
d) Cyclic Subgroup of G

- ○ A
- ◉ B
- ○ C
- ○ D

*

If a and b are any two elements of a group G such that $(a*b)^2 = a^2 * b^2$, then G is a ....

a) Cyclic group

b) Abelian Group

c) Permutation Group

d) Dihedral Group

- ○ A
- ◉ B
- ○ C
- ○ D

*

. The identity element of a group is the only element whose order is ...

a) 1

b) 2

c) n

d) m + n

- (●) A
- ( ) B
- ( ) C
- ( ) D

*

The multiplicative group $\{1, \omega, \omega^2\}$ where ω is a cube root of unity is a ....

a)Ring

b) Non-abelian group

c) Cyclic group

d) Monoid

- ( ) A
- ( ) B
- (●) C
- ( ) D

*

A commutative ring with unity and without zero divisors is called an ....

a) Integral domain

b) zero divisor

c) Ring homomorphism

d) Field

- (selected) A
- B
- C
- D

*

Every finite integral domain is a ....

a) cyclic group

b) Non-commutative Ring

c)Non abelian group

d) Field

- A
- B
- C
- (selected) D

*

The inverse operation of encoding is............

a)Group code

b) Hamming code

c)) Decoding

d) Input message

- ○ A
- ○ B
- ◉ C
- ○ D

*

The number of 1's in the binary string is called................

a) Distance

b) Group code

c)weight

d) Parity digit

- ○ A
- ○ B
- ◉ C
- ○ D

*

A code can correct a set of atmost 'K' errors iff the minimum distance between any two code words is atleast ....

a) 2k-1

b) k+1

c) k

d) 2k + 1

- ( ) A
- ( ) B
- ( ) C
- (•) D

*

The number of errors can be corrected between the encoded words 000 and 111 is

a) Three errors

b) Two errors

c) Zero or one error

d) Four errors

- ( ) A
- ( ) B
- (•) C
- ( ) D

*

If x = 10110 , y = 11110, then H(x,y) =

a)2

b) 1

c) 3

d) 4

- ( ) A
- (•) B
- ( ) C
- ( ) D

*

.The device which transforms the encoded message into their original form is.....

a) encoder

b) Decoder

c) Hamming Code

d) coding theory

- ( ) A
- (•) B
- ( ) C
- ( ) D

*

.If $(B^n, \oplus)$ is .... where $\oplus$ is addition modulo 2

a) Field

b) Cyclic group

c) Abelian group

d) Ring homomorphism.

- [ ] A
- [ ] B
- [x] C
- [ ] D

*

5.Find the code words for e(111), e(110) generated by the parity check matrix:

$$I = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$ when the encoding function is e: $B^3 \rightarrow B^6$,

a) 000000,001010
b) 000110,100110
c) 110000,110100
d) 111001,110010

- ○ A
- ○ B
- ○ C
- ◉ D

*

A graph in which loops and parallel edges are allowed is called a .....
(A) weighted graph
(B) simple graph
(C) multigraph
(D) pseudograph

- ○ A
- ○ B
- ○ C
- ◉ D

*

Which of the following statement for a graph is correct?
(A) Simple path in a graph crosses the vertex any number of times.
(B) A graph can exists without edges.
(C) An edge in a graph is incident on more than two vertices.
(D) Total degree of the vertices is odd.

- ○ A
- ◉ B
- ○ C
- ○ D

*

Let G be a simple connected graph such that every vertex in G has degree 4. If number of edges $(|E|) = 16$, then the number of vertices $(|V|)=$
(A) 4
(B) 8
(C) 9
(D) 16

- ○ A
- ◉ B
- ○ C
- ○ D

*

How many edges are there in a complete bipartite graph $K_{5,7}$?
(A) 35
(B) 12
(C) 42
(D) 49

- ◉ A
- ○ B
- ○ C
- ○ D

*

A graph is called a .... if it is connected and has no circuits.
(A) Cyclic graph
(B) Regular graph
(C) Tree
(D) Not graph

- ○ A
- ○ B
- ◉ C
- ○ D

*

A .... circuit of G is a circuit which includes every edge of G exactly once?
(A) Euler
(B) Hamiltonian
(C) Planar
(D) Isomorphic

- ◉ A
- ○ B
- ○ C
- ○ D

*

Chromatic number of a circuit of length 9 (C_9) is
(A) 9
(B) 5
(C) 2
(D) 3

- ( ) A
- ( ) B
- ( ) C
- (•) D

*

Which of the following statement is false?
(A) Total degree of a tree with n vertices is $2n - 2$
(B) There is no circuit in a tree
(C) There exists a tree with 8 vertices and 8 edges
(D) A tree with e edges has $e + 1$ vertices

- ( ) A
- ( ) B
- (•) C
- ( ) D

*

The maximum number of edges in a simple disconnected graph with n vertices and k components is

(A) $\dfrac{(n+k)(n+k+1)}{2}$

(B) $\dfrac{(n+k)(n-k+1)}{2}$

(C) $\dfrac{(n-k)(n-k+1)}{2}$

(D) $\dfrac{(n-k)(n+k+1)}{2}$

- ( ) A
- ( ) B
- (•) C
- ( ) D

*

Which of the following completely bipartite graph is a complete graph?

(A) $K_{7,5}$

(B) $K_{1,1}$

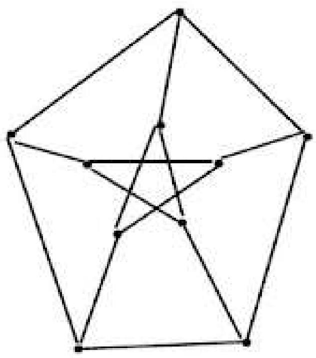
(C) $K_{n,n}$

(D) $K_{m,n}$

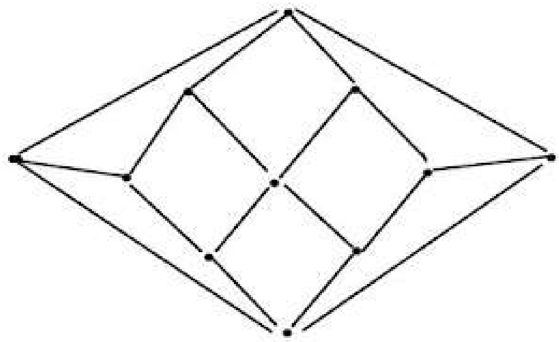
- ( ) A
- (•) B
- ( ) C
- ( ) D

*

Which of the following is true for the graph A and graph B of 10 and 11 vertices respectively?



Graph A



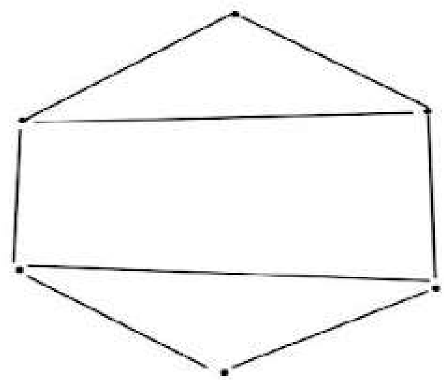
Graph B

(A) Both graphs A and B contain a Hamiltonian circuit
(B) Neither graph A nor B contains a Hamiltonian circuit
(C) Graph A contains a Hamiltonian circuit
(D) Graph B contains a Hamiltonian circuit

- ○ A
- ○ B
- ◉ C
- ○ D

*

Which of the following is true for the following graph G with 6 vertices?



Graph G

(A) G is Hamiltonian but not Eulerian
(B) G is both Eulerian and Hamiltonian
(C) G is neither Eulerian and Hamiltonian
(D) G is Eulerian but not Hamiltonian

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

A vertex which is adjacent to exactly one vertex is called
(A) Isolated Vertex
(B) Pendant Vertex
(C) Incident Vertex
(D) Simple Vertex

- ○ A
- ◉ B
- ○ C
- ○ D

*

Every complete graph is
(A) Completely bipartite
(B) Tree
(C) Regular
(D) Bipartite

- ○ A
- ○ B
- ◉ C
- ○ D

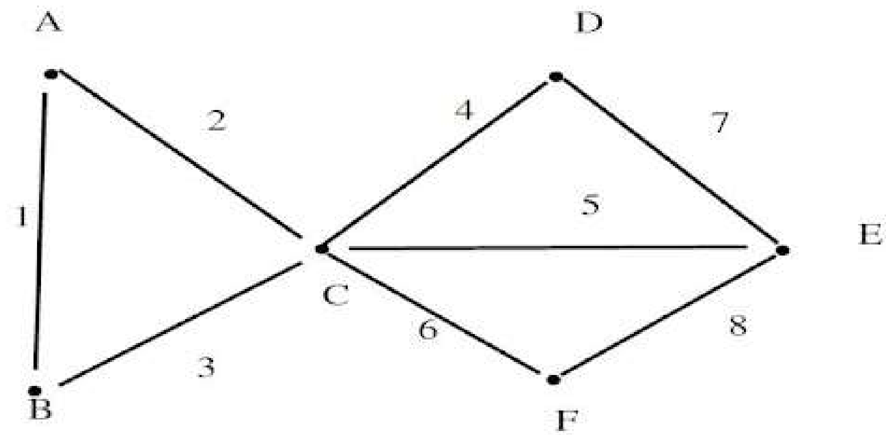
*

The number of edges of a complete graph K_{10} is
(A) 10
(B) 25
(C) 20
(D) 45

- ○ A
- ○ B
- ○ C
- ◉ D

*

Find the total minimum weight for the following weighted graph using Kruskal's Algorithm

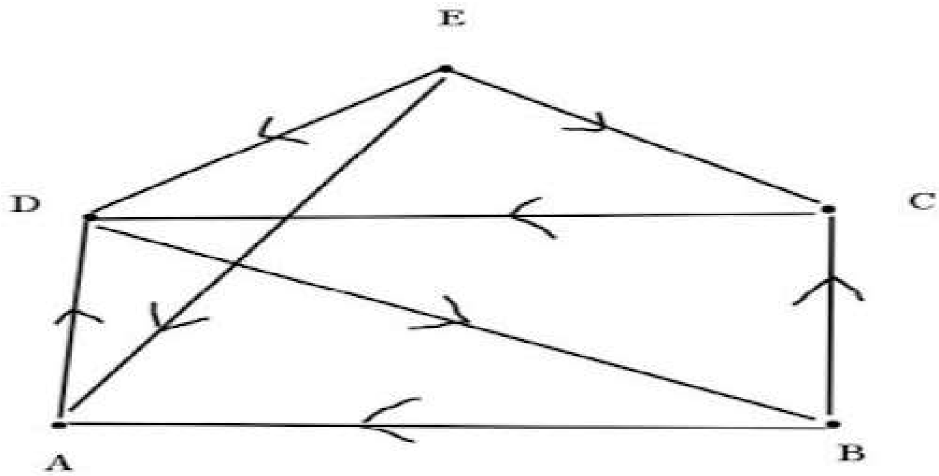


(A) 18
(B) 15
(C) 12
(D) 20

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

The sum of the indegree vertices for the following directed graph is



(A) 8
(B) 9
(C) 10
(D) 11

- [x] A
- [ ] B
- [ ] C
- [ ] D

*

The adjacency matrix corresponding to a complete graph of 4 vertices $(K_4)$is

$$(A) \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} \quad (B) \begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix} \quad (C) \begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix} \quad (D) \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 \end{pmatrix}$$

- ○ A
- ○ B
- ◉ C
- ○ D

*

What is the chromatic number of the complete bipartite graph $K_{m,n}$?

(A) 2
(B) 3
(C) 6
(D) 5

- ◉ A
- ○ B
- ○ C
- ○ D

*

A row with all 0 (zero) entries in the incidence matrix corresponds to ....
(A) pendant vertex
(B) an isolated vertex
(C) a vertex of degree 2
(D) a vertex of degree 3

- ○ A
- ◉ B
- ○ C
- ○ D

*

If there is a unique path between every pair of vertices then the graph is
(A) Connected circuitless graph
(B) Disconnected graph
(C) Connected Cyclic graph
(D) Complete graph

- ◉ A
- ○ B
- ○ C
- ○ D

*

Length of the path of a graph is the
(A) Number of vertices in the graph
(B) Number of edges in the path
(C) Number of vertices in the path
(D) Number of edges in the graph

- [ ] A
- [x] B
- [ ] C
- [ ] D

*

If the origin and terminal vertex of the path are same then the path is called
(A) Euler path
(B) Tree
(C) Circuit
(D) Hamiltonian path

- ○ A
- ○ B
- ◉ C
- ○ D

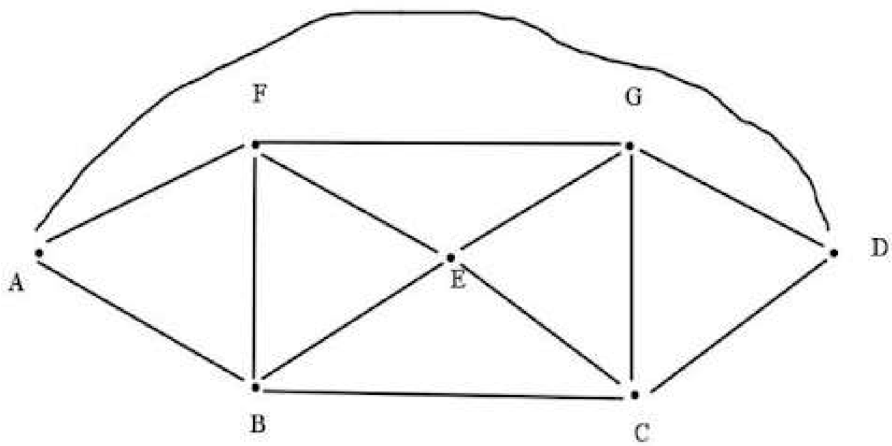
*

Which of the following graph is 4-Chromatic?
(A) Complete bipartite graph of 3,3 vertices ($K_{3,3}$)
(B) Complete graph of 5 vertices (K_5)
(C) Complete graph of 4 vertices (K_4)
(D) Complete bipartite graph of 4,4 vertices ($K_{4,4}$)

- ○ A
- ○ B
- ◉ C
- ○ D

*

What is the chromatic number of the following graph with 7 vertices?



(A) 3
(B) 4
(C) 1
(D) 2

- [ ] A
- [x] B
- [ ] C
- [ ] D