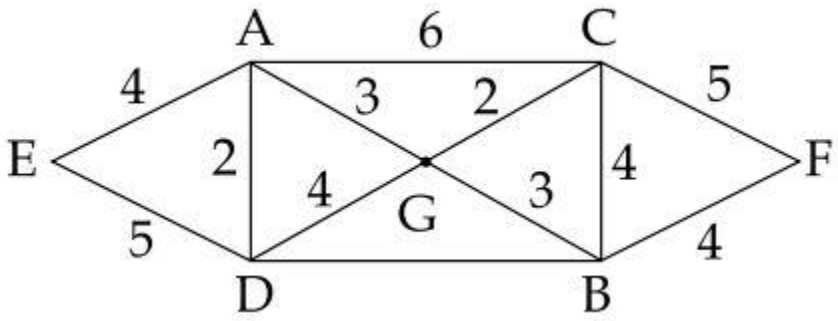
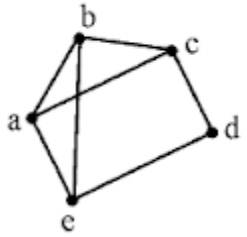
Graph Theory

1. (ugc net dec2005UGC NET NOV 2017 PAPER 2 Q-5) Consider the graph given below :

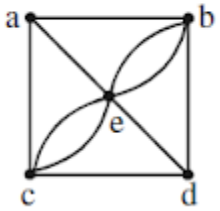


Use Kruskal's algorithm to find a minimal spanning tree for the graph. The List of the edges of the tree in the order in which they are chosen is?
(1) AD, AE, AG, GC, GB, BF
(2) GC, GB, BF, GA, AD, AE
(3) GC, AD, GB, GA, BF, AE
(4) AD, AG, GC, AE, GB, BF
Answer: Marks to all

2. (UGCNET-AUG2016-II-5) Given the following graphs :



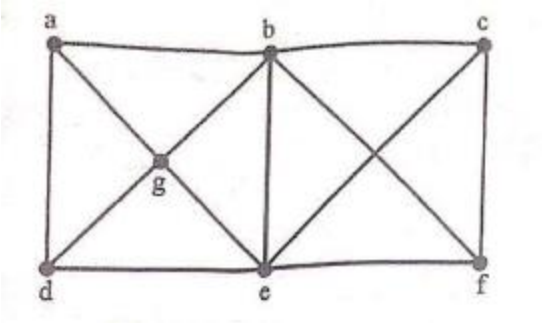
(G_1)



(G_2)

Which of the following is correct?
(A) G_1 contains Euler circuit and G_2 does not contain Euler circuit.
(B) G_1 does not contain Euler circuit and G_2 contains Euler circuit.
(C) Both G_1 and G_2 do not contain Euler circuit.
(D) Both G_1 and G_2 contain Euler circuit.
Answer: C

3. (UGCNET-June2016-II-5) A clique in a simple undirected graph is a complete subgraph that is not contained in any larger complete subgraph. How many cliques are there in the graph shown below?



(A) 2 (B) 4
(C) 5 (D) 6
Answer: C

4. (UGCNET-Dec2015-II-2) Which of the following statement(s) is/are false?

(a) A connected multigraph has an Euler Circuit if and only if each of its vertices has even degree.

(b) A connected multigraph has an Euler Path but not an Euler Circuit if and only if it has exactly two vertices of odd degree.

(c) A complete graph (K_n) has a Hamilton Circuit whenever $n \geq 3$

(d) A cycle over six vertices (C_6) is not a bipartite graph but a complete graph over 3 vertices is bipartite.

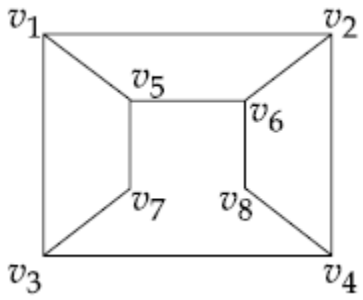
Codes:

(A) (a) only (B) (b) and (c)

(C) (c) only (D) (d) only

Answer: D

5. (UGCNET-Dec2015-II-4) Consider the graph given below:



The two distinct sets of vertices, which make the graph bipartite are:

(A) (v_1, v_4, v_6); (v_2, v_3, v_5, v_7, v_8) (B) (v_1, v_7, v_8); (v_2, v_3, v_5, v_6)

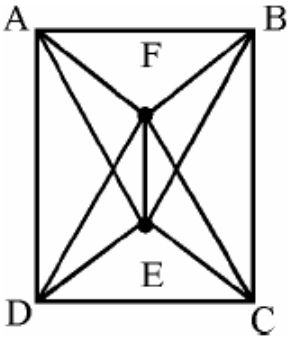
(C) (v_1, v_4, v_6, v_7); (v_2, v_3, v_5, v_8) (D) (v_1, v_4, v_6, v_7, v_8); (v_2, v_3, v_5)

Answer: C

6. (UGCNET-June2015-II-5) Consider a Hamiltonian Graph (G) with no loops and parallel edges. Which of the following is true with respect to this Graph (G) ?
(a) deg(v) ≥ n/2 for each vertex of G
(b) |E(G)| ≥ 1/2 (n-1)(n-2)+2 edges
(c) deg(v) + deg(w) ≥ n for every v and w not connected by an edge
(A) (a) and (b) (B) (b) and (c)
(C) (a) and (c) (D) (a), (b) and (c)
Answer: C

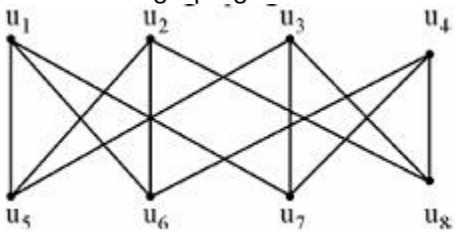
7. (UGCNET-Dec2014-II-02) A certain tree has two vertices of degree 4, one vertex of degree 3 and one vertex of degree 2. If the other vertices have degree 1, how many vertices are there in the graph?
(A) 5 (B) n – 3
(C) 20 (D) 11
Answer: D

8. (UGCNET-Dec2014-II-03) Consider the Graph shown below :

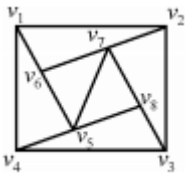


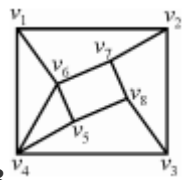
This graph is a .....
(A) Complete Graph (B) Bipartite Graph
(C) Hamiltonian Graph (D) All of the above
Answer: C

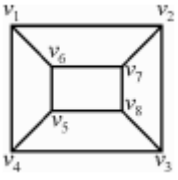
9. (UGCNET-June2014-II-21) Consider the graph given below as :

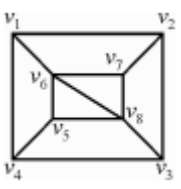


Which one of the following graph is isomorphic to the above graph?

A. 

B 

C 

D 

Answer: C

10. (UGCNET-Dec2013-II-39) A graph is non-planar if and only if it contains a subgraph homeomorphic to
    (A) $K_{3,2}$ or K_5 (B) $K_{3,3}$ and K_6
    (C) $K_{3,3}$ or K_5 (D) $K_{2,3}$ and K_5
    Answer: C

11. (UGCNET-Sep2013-II-20) Consider the following statements:
    (i) A graph in which there is a unique path between every pair of vertices is a tree.
    (ii) A connected graph with e = v – 1 is a tree.
    (iii) A graph with e = v – 1 that has no circuit is a tree.
    Which of the above statements is/are true?
    (A) (i) & (iii) (B) (ii) & (iii)
    (C) (i) & (ii) (D) All of the above
    Answer: D

12. (UGCNET-June2013-II-37) Which of the following connected simple graph has exactly one spanning tree?
    (A) Complete graph (B) Hamiltonian graph
    (C) Euler graph (D) None of the above
    Answer: D

13. (UGCNET-June2013-II-38) How many edges must be removed to produce the spanning forest of a graph with N vertices, M edges and C connected components?
    (A) M+N-C (B) M-N-C
    (C) M-N+C (D) M+N+C
    Answer: C

14. (UGCNET-June2012-II-4) The number of colours required to properly colour the vertices of every planer graph is
    (A) 2 (B) 3
    (C) 4 (D) 5
    Answer: D

15. An undirected graph possesses an eulerian circuit if and only if it is connected and its vertices are
    (A) all of even degree
    (B) all of odd degree
    (C) of any degree
    (D) even in number
    Answer: A
    December 2010 Ugc Computer Science Paper II Solved No 2

16. (UGCNET-june2009-ii-12) The complete graph with four vertices has k edges where k is:
    (A) 3
    (B) 4
    (C) 5
    (D) 6
    Answer: D

17. (UGCNET-june2009-ii-23) Which two of the following are equivalent for an undirected graph G?
    (i) G is a tree

(ii) There is at least one path between any two distinct vertices of G
(iii) G contains no cycles and has (n-1) edges
(iv) G has n edges
(A) (i) and (ii)
(B) (i) and (iii)
(C) (i) and (iv)
(D) (ii) and (iii)
Answer: B

18. (UGCNET-dec2008-ii-2)The graph $K_{3,4}$ has:
(A) 3 edges
(B) 4 edges
(C) 7 edges
(D) 12 edges
Answer: D

19. (UGCNET-Sep2013-II-8) The number of edges in a complete graph with N vertices is equal to:
(A) N(N−1) (B) 2N−1
(C) N−1 (D) N(N−1)/2
Answer: D

20. T is a graph with n vertices. T is connected and has exactly n-1 edges, then:
(A) T is a tree
(B) T contains no cycles
(C) Every pairs of vertices in T is connected by exactly one path
(D) All of these
Answer: D

21. (GATE2010-28)The following lists are the degrees of all the vertices of a graph:
(i) 1, 2, 3, 4, 5 (ii) 3, 4, 5, 6, 7
(iii) 1, 4, 5, 8, 6 (iv) 3, 4, 5, 6
then, which of the above sequences are graphic?
(A) (i) and (ii)
(B) (iii) and (iv)
(C) (iii) and (ii)
(D) (ii) and (iv)
Answer: B

22. (UGCNET-DEC2016-II-5) Consider a Hamiltonian Graph G with no loops or parallel edges and with $|V(G)|=n\geq 3$. Then which of the following is true?
(1) $\deg(v) \geq n/2$ for each vertex v.
(2) $|E(G)| \geq 1/2(n-1)(n-2)+2$
(3) $\deg(v)+\deg(w) \geq n$ whenever v and w are not connected by an edge.
(4) All of the above
Answer: 4

23. (UGCNET-June2016-II-2) The number of different spanning trees in complete graph, K_4 and bipartite graph $K_{2,2}$ have ..... and .....…. respectively.
(A) 14, 14 (B) 16, 14
(C) 16, 4 (D) 14, 4
Answer: C

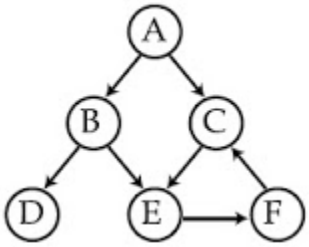
24. (UGCNET-June2014-II-23) Consider a complete bipartite graph $k_{m,n}$. For which values of m and n does this, complete graph have a Hamilton circuit
    (A) m=3, n=2 (B) m=2, n=3
    (C) m=n≥2 (D) m=n≥3
    Answer: C

25. The minimum number of edges in a connected graph with 'n' vertices is equal to
    (A) n(n–1)
    (B) n(n–1)/2
    (C) n^2
    (D) n–1
    Answer: D
    UGCNET-Sep2013-II-8

26. (UGCNET-june2009-ii-23)Which two of the following are equivalent for an undirected graph G?
    (i) G is a tree
    (ii) There is at least one path between any two distinct vertices of G
    (iii) G contains no cycles and has (n-1) edges
    (iv) G has n edges
    (A) (i) and (ii)
    (B) (i) and (iii)
    (C) (i) and (iv)
    (D) (ii) and (iii)
    Answer: B

27. The graph $K_{3,4}$ has:
    (A) 3 edges
    (B) 4 edges
    (C) 7 edges
    (D) 12 edges
    Answer: D
    UGCNET-dec2008-ii-2

28. (UGC net paper-2-june-2007 No 2) Depth ion travels of the following directed graph is:



    (A) ABCDEF
    (B) ABDEFC
    (C) ACEBDF
    (D) None of the above
    Answer: B

29. (UGC net paper-ii-dec-2004 No 4)The following lists are the degrees of all the vertices of a graph:
    (i) 1, 2, 3, 4, 5 (ii) 3, 4, 5, 6, 7
    (iii) 1, 4, 5, 8, 6 (iv) 3, 4, 5, 6

then, which of the above sequences are graphic?
(A) (i) and (ii)
(B) (iii) and (iv)
(C) (iii) and (ii)
(D) (ii) and (iv)
Answer: B

30. (UGC net paper-2-dec-2005 No 1) T is a graph with n vertices. T is connected and has exactly n-1 edges, then:
(A) T is a tree
(B) T contains no cycles
(C) Every pairs of vertices in T is connected by exactly one path
(D) All of these
Answer: D

31. (UGCNET-Dec2013-III-4) Given a flow graph with 10 nodes, 13 edges and one connected components, the number of regions and the number of predicate (decision) nodes in the flow graph will be

(A) 4, 5

(B) 5, 4

(C) 3, 1

(D) 13, 8

Answer: B

32. (UGCNET-Dec2013-III-39) A ..... complete subgraph and a ..... subset of vertices of a graph G=(V,E) are a clique and a vertex cover respectively.
(A) minimal, maximal
(B) minimal, minimal
(C) maximal, maximal
(D) maximal, minimal
Answer: D

33. (UGCNET-Dec2013-III-6) Which of the following points lies on the same side as the origin, with reference to the line 3x+7y=2 ?
(A) (3, 0)
(B) (1, 0)
(C) (0.5, 0.5)
(D) (0.5, 0)
Answer: D

34. (UGCNET-DEC2016-II-5) Consider a Hamiltonian Graph G with no loops or parallel edges and with $|V(G)|=n\geq 3$. Then which of the following is true?
(1) $\deg(v) \geq n/2$ for each vertex v.
(2) $|E(G)| \geq 1/2(n-1)(n-2)+2$
(3) $\deg(v)+\deg(w) \geq n$ whenever v and w are not connected by an edge.

(4) All of the above
Answer: 4

35. (UGCNET-June2016-II-2) The number of different spanning trees in complete graph, K_4 and bipartite graph $K_{2,2}$ have ..... and ..... respectively.
(A) 14, 14 (B) 16, 14
(C) 16, 4 (D) 14, 4
Answer: C

36. (UGCNET-June2016-II-2Paper II December 2011 No 7) McCabe's cyclomatic metric V(G) of a graph G with n vertices, e edges and p connected component is
(A) e (B) n
(C) e – n + p (D) e – n + 2p
Answer: C

37. For a complete graph with N vertices, the total number of spanning trees is given by:
(A) 2N-1
(B) N^{N-1}
(C) N^{N-2}
(D) 2N+1
Answer: C
June 2006 Paper - II Solved No 2

38. (UGC net dec-2006 PP2 No 3)The number of edges in a complete graph with N vertices is equal to:
(A) N(N−1) (B) 2N−1
(C) N−1 (D) N(N−1)/2
Answer: D

39. (UGCNET-june2009-ii-12)The complete graph with four vertices has k edges where k is:
(A) 3
(B) 4
(C) 5
(D) 6
Answer: D

40. (UGCNET-june2009-ii-12paper-ii-june-2010 No 1)Which of the following does not define a tree?
(A) A tree is a connected acyclic graph.
(B) A tree is a connected graph with n-1 edges where 'n' is the number of vertices in the graph.
(C) A tree is an acyclic graph with n-1 edges where 'n' is the number of vertices in the graph.
(D) A tree is a graph with no cycles.
Answer: D

41. The number of edges in a complete graph with '*n*' vertices is equal to:
(A) $n(n\text{-}1)$ (B) $n(n\text{-}1)/2$
(C) n^2 (D) $2n\text{-}1$
Answer: B

42. (UGCNET-dec2009-ii-02)Circle has …….
(A) No vertices
(B) Only 1 vertex
(C) ∞ vertices

(D) None of these
Answer: A

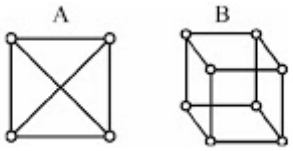
43. (UGC net cse June 2010 paper 2) S_1 : I teach algorithms and maths.
S_2 : My professor teaches maths, electronics and computer science.
S_3 : I have a student of maths.
S_4 : Algorithm is a part of computer science.
S_5 : Maths students know computer science.
What would be the chromatic number of a graph, vertices of which are the actors/entities that are involved in the sentences S_1 to S_5 and edges-to represent the associations/relationships amongst the entities/actors as expressed in the sentences S_1 to S_5 above?
(A) 2
(B) 3
(C) 4
(D) None of these
Answer: A]

44. (GATE2002-1.25, ISRO2008-30, ISRO2016-6)Maximum number of edges in a n-Node undirected graph without self loop is
(A) n^2 (B) n(n – 1)
(C) n(n + 1) (D) n(n – 1)/2
Answer: D

45. McCabe's cyclomatic metric V(G) of a graph G with n vertices, e edges and p connected component is
(A) e (B) n
(C) e – n + p (D) e – n + 2p
Answer: C

46. (UGCNET-Dec2013-II-36)How many edges are there in a forest of t-trees containing a total of n vertices ?
(A) n+t (B) n-t
(C) n*t (D) n^t
Answer: B

47. (UGCNET-Dec2012-III-46) Two graphs A and B are shown below :
Which one of the following statement is true?

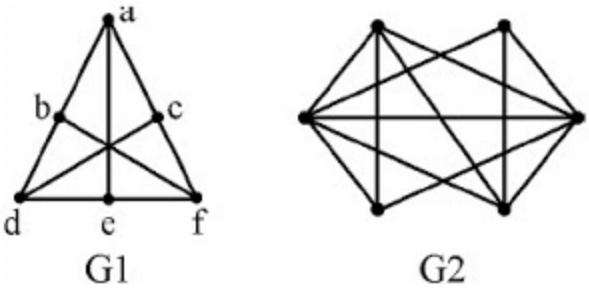


(A) Both A and B are planar.
(B) Neither A nor B is planar.
(C) A is planar and B is not.
(D) B is planar and A is not.
Answer: A

48. (GATE2007-IT-3, UGCNET-June2012-III-34) Consider a weighted undirected graph with positive edge weights and let (u, v) be an edge in the graph. It is known that the shortest path from source vertex s to u has weight 53 and shortest path from s to v has weight 65. Which statement is always true?
(A) Weight (u, v) <= 12

(B) Weight (u, v) = 12
(C) Weight (u, v) >= 12
(D) Weight (u, v) > 12
Answer: C

49. (UGCNET-June2012-III-72)



G1 and G2 are two graphs as shown :
(A) Both G1 and G2 are planar graphs.
(B) Both G1 and G2 are not planar graphs.
(C) G1 is planar and G2 is not planar graph.
(D) G1 is not planar and G2 is planar graph.
Answer: D

50. (UGCNET-June2012-III-33)Which one of the following statements is incorrect?
(A) The number of regions corresponds to the cyclomatic complexity.
(B) Cyclometric complexity for a flow graph G is V(G) = N–E+2, where E is the number of edges and N is the number of nodes in the flow graph.
(C) Cyclometric complexity for a flow graph G is V(G) = E–N+2, where E is the number of edges & N is the number of nodes in the flow graph.
(D) Cyclometric complexity for a flow graph G is V(G) = P + 1, where P is the number of predicate nodes contained in the flow graph G.
Answer: B

51. (UGCNET-June2013-III-15)A vertex cover of an undirected graph G(V, E) is a subset $V_1 \subseteq V$ vertices such that
(A) Each pair of vertices in V_1 is connected by an edge
(B) If (u, v) $\in$ E then u $\in V_1$ and v $\in V_1$
(C) If (u, v) $\in$ E then u $\in V_1$ or v $\in V_1$
(D) All pairs of vertices in V_1 are not connected by an edge
Answer: C

52. (UGCNET-June2014-III-65) Given the following statements :
S1 : The subgraph-isomorphism problem takes two graphs G1 and G2 and asks whether G1 is a subgraph of G2.
S2 : The set-partition problem takes as input a set S of numbers and asks whether the numbers can be partitioned into two sets A

and $\bar{A} = S - A$ such that

$$\sum_{x \in A} x = \sum_{x \in \bar{A}} x$$

Which of the following is true?

(A) S_1 is NP problem and S_2 is P problem.
(B) S_1 is NP problem and S_2 is NP problem.
(C) S_1 is P problem and S_2 is P problem.
(D) S_1 is P problem and S_2 is NP problem.
Answer: B

53. (UGCNET-DEC2016-II-5)Consider a Hamiltonian Graph G with no loops or parallel edges and with $|V(G)|=n\geq 3$. Then which of the following is true?
(1) $\deg(v) \geq n/2$ for each vertex v.
(2) $|E(G)| \geq 1/2(n-1)(n-2)+2$
(3) $\deg(v)+\deg(w) \geq n$ whenever v and w are not connected by an edge.
(4) All of the above
Answer: 4

54. (UGCNET-dec2008-ii-3) The total number of spanning trees that can be drawn using five labelled vertices is:
(A) 125
(B) 64
(C) 36
(D) 16
Answer: A