Quiz-IV: Algorithmic Graph Theory (AGT)

1st Sem, M.Tech (CSE & CSEIS) and Research Scholar dated 15/11/2021 at 12.00 Noon
Instructions: Answer all questions. Full Marks 26, Time 30 Minutes
Name and Admission No. Entry is compulsory.

* Required

Email *

Your email

The maximum number of edges in a bipartite graph on 12 vertices is

- 36
- 48
- 12
- 24

Which relation given below is true?

- rad (G) ≤ diam (G) ≤ 2* rad (G)
- rad (G) ≤ diam (G) ≥ 2* rad (G)
- rad (G) < diam (G) < 2* rad (G)
- all of the above

Let G be an arbitrary graph with n nodes and k components. If a vertex is removed from G, the number of components in the resultant graph must necessarily lie between

- k and n
- k-1 and k+1
- k-1 and n-1
- k+1 and n-k

Peterson graph is non-planner because

- It's sub graph contain sub division of K5
- It's sub graph contain sub division of K3,3
- It's contain K5 minor
- Both b and c

Which of the following graphs has an Eulerian circuit?

- Any k regular graph where k is an even number
- A complete graph on 90 vertices
- Complement of cycle on 25 vertices
- None of above

Consider an undirected un-weighted graph G. Let a breadth-first traversal of G be done starting from a node r. Let d(r, u) and d(r, v) be the lengths of the shortest paths from r to u and v respectively in G. If u is visited before v during the breadth-first traversal, which of the following statements is correct?

- d(r, u)<d(r, v)
- d(r, u)>d(r, v)
- d(r, u)≤d(r, v)
- None of the above

Name *

Your answer

A minimal spanning tree of a graph G is....

- A spanning sub graph
- A tree
- Minimum weights
- All of above

Let G be an arbitrary graph with n nodes and k components. If a vertex is removed from G, the number of components in the resultant graph must necessarily lie between

- k and n
- k-1 and k+1
- k-1 and n-1
- k+1 and n-k

Every non – trivial connected graph contains ≥ 2 vertices that are not cut vertices.

- True
- False

Consider an undirected random graph of eight vertices. The probability that there is an edge between a pair of vertices is 1/2. What is the expected number of unordered cycles of length three?

- 1/8
- 1
- 7
- 8

Which one of the following is TRUE for any simple connected undirected graph with more than 2 vertices?

- No two vertices have the same degree
- At least two vertices have the same degree
- At least three vertices have same degree
- None of these

Let G be the non-planar graph with the minimum possible number of edges. Then G has

- 9 edges and 5 vertices
- 9 edges and 6 vertices
- 10 edges and 5 vertices
- 10 edges and 6 vertices

How many undirected graphs (not necessarily connected) can be constructed out of a given set V = {v1, v2, ... vn} of n vertices?

- n(n-1)/2
- 2**n
- n!
- 2**n(n-1)/2

Let G be a simple undirected planar graph on 10 vertices with 15 edges. If G is a connected graph, then the number of bounded faces in any embedding of G on the plane is equal to

- 4
- 5
- 6
- 7

If a graph have Hamiltonian path then it is possible that the graph also has Hamiltonian circuit.

- True
- False

Which of the following statements are TRUE? a) The problem of determining whether there exists a cycle in an undirected graph is in P. b) The problem of determining whether there exists a cycle in an undirected graph is in NP. c) If a problem A is NP-Complete, there exists a non-deterministic polynomial time algorithm to solve A.

- a, b, c
- a, c
- b, c
- a, b

The maximum number of edges in a bipartite graph on 12 vertices is

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- 48
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If G is a disconnected graph then

- C($\overline{G}$) is disconnected
- C($\overline{G}$) is connected and diam ($\overline{G}$) ≤ 1
- C($\overline{G}$) is connected and diam ($\overline{G}$) ≤ 2
- None of these

I is an independent set in G, if and only if o V(G) is vertex cover V(G) – I is vertex cover of Go Both a and bo None of these

- V(G) is vertex cover
- V(G) – I is vertex cover of G
- Both a and b
- None of these

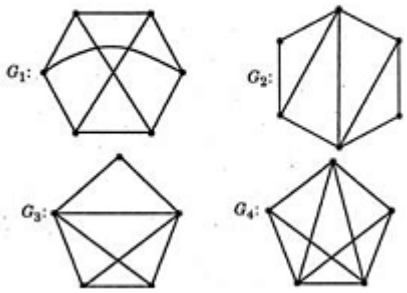
Admission No. *

Your answer

Let S be an NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is true?

- R is NP-complete
- R is NP-hard
- Q is NP-complete
- Q is NP-hard

Which of the following graph is planner?



- G1
- G2
- G3
- G4

G1 is not planar
G2,G3,G4 are all planar

Which one of the following is TRUE for any simple connected undirected graph with more than 2 vertices?

- No two vertices have the same degree
- At least two vertices have the same degree
- At least three vertices have same degree
- None of these

Let G1 = (V, E1) and G2 = (V, E2) be connected graphs on the same vertex set V with more than two vertices. If G1∩G2 = (V, E1∩E2) is not a connected graph, then the graph G1∪G2=(V, E1∪E2)

- Can't have a cut vertex
- Must have a cycle
- Must have a cut edge(bridge)
- Has a chromatic no strictly greater than those of G1 and G2

Which of the following graphs has an Eulerian circuit?

- ○ Any k regular graph where k is an even number
- ○ A complete graph on 90 vertices
- ○ Complement of cycle on 25 vertices
- ○ None of above

The most efficient algorithm for finding the number of connected components in an undirected graph on n vertices and m edges is come under which class

- ○ NP problem
- ○ P problem
- ○ NPC problem
- ○ None of these

What is the largest integer m such that every simple connected graph with n vertices and n edges contains at least m different spanning trees?

- ○ 1
- ○ 2
- ○ 3
- ○ n

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