
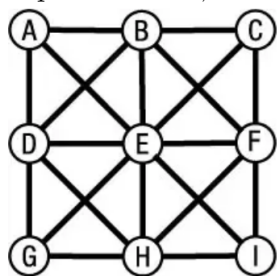


Giảng viên ra đề: (Chữ ký và Họ tên)	(Ngày ra đề)	Người phê duyệt: (Chữ ký và họ tên)	(Ngày duyệt đề)
--	--------------	---	-----------------

<div></div> <div>TRƯỜNG ĐH BÁCH KHOA - ĐHQG-HCM</div> <div>KHOA KH & KT MÁY TÍNH</div>	ÔN TẬP		Học kỳ / Năm học		1	2022-2023
			Ngày thi		18-12-2022	
	Môn học	Cấu trúc rời rạc cho KHMT				
	Mã môn học	CO1007				
	Thời lượng	60 phút	Mã đề	2210		
Ghi chú: - Sinh viên được phép đem theo một tờ A4 viết tay và được dùng máy tính cầm tay. - Sinh viên nộp lại đề sau khi thi.						

In questions 1–7, we consider undirected graph G_1 with incidence matrix as follows:



1. Which of the following matrices is the adjacency matrix of G_1 ?

A.
$$\begin{bmatrix} 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 \end{bmatrix}$$

B.
$$\begin{bmatrix} 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 1 & 1 & 0 & 1 & 0 \end{bmatrix}$$

C. None of them. D. Both of them.

2. What is the chromatic number of graph G_1 ?

A. 2 B. 3 C. 4 D. 5

3. Is G_1 a bipartite graph?

A. Yes B. No

4. Could we consider G_1 as a planar graph?

A. Yes B. No

5. Graph G_1 has how many bridges?

A. 0 B. 1 C. 2 D. 3

6. What is the values of $\kappa(G_1), \lambda(G_1)$ respectively?

A. $\lambda(G_1) = 3, \kappa(G_1) = 3$ B. $\lambda(G_1) = 2, \kappa(G_1) = 3$ C. $\lambda(G_1) = 1, \kappa(G_1) = 2$ D. None of them

7. Which of the following assertions is true for the graph G_1 ?

A. The vertex cut of G_1 is $\{C, F\}\{A, B\}\{B, C\}$
 B. The edge cut of G_1 is $\{E, F\}\{D, E\}\{E, H\}$
 C. The vertex cut of G_1 is $\{D, G\}\{H, G\}\{D, H\}$
 D. None of the above assertions is correct

8. Box P has 2 red balls and 3 blue balls and box Q has 3 red balls and 1 blue ball. A ball is selected as follows:
 (i) Select a box
 (ii) Choose a ball from the selected box such that each ball in the box is equally likely to be chosen. The probabilities of selecting boxes P and Q are $(1/3)$ and $(2/3)$, respectively.
 Given that a ball selected in the above process is a red ball, the probability that it came from the box P is:

A. $4/19$ B. $5/19$ C. $2/19$ D. $19/30$

9. An airline sells 62 tickets for a plane with capacity of 60 passengers. This is done because it is possible for some people to not show up. The probability of a person not showing up for the flight is 0.1. All passengers behave independently. Find the probability of the event that the airline does not have to arrange separate tickets for excess people.

A. 0.788 B. 0.888 C. 0.988 D. 0.688

10. The probability that a person will get an electric contract is $2/5$ and probability that he will not get plumbing contract is $4/7$. If the probability of getting at least one contract is $2/3$, what is the probability of getting both ?

A. $17/105$ B. $18/105$ C. $17/106$ D. $18/106$

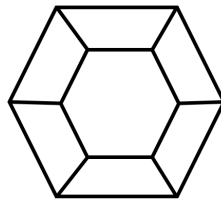
11. In a batch, there are 80% C programmers, and 40% are Java and C programmers. What is the probability that a C programmer is also Java programmer?

A. 0.5 B. 0.6 C. 0.7 D. 0.4

12. In a computer science department, a student club can be formed with either 10 members from first year or 8 members from second year or 6 from third year or 4 from final year. What is the minimum no. of students we have to choose randomly from department to ensure that a student club is formed?

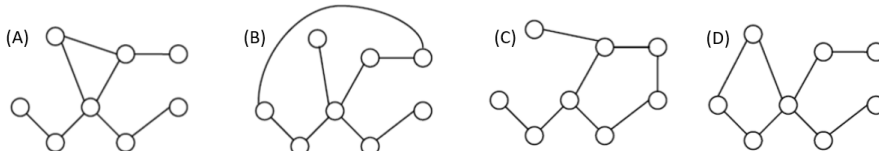
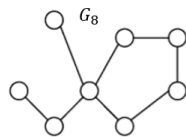
A. 21 B. 25 C. 31 D. 17

13. The following graph below exists:



A. Hamilton circuit and Euler path B. Euler path
 C. Hamilton path D. Hamilton circuit

14. Which of the following graphs is isomorphic to G_8 ?



A. C B. A and B . C. D D. B

15. Which one of the following statements is True about the bridge of a graph?

A. A tree has no bridge.
 B. Every edge of a complete subgraph with size greater than or equal 3 is a bridge (A complete subgraph is a subgraph consists of all chosen vertices and its incident edges).
 C. A graph with bridges cannot have a cycle.
 D. A bridge cannot be part of a simple cycle.

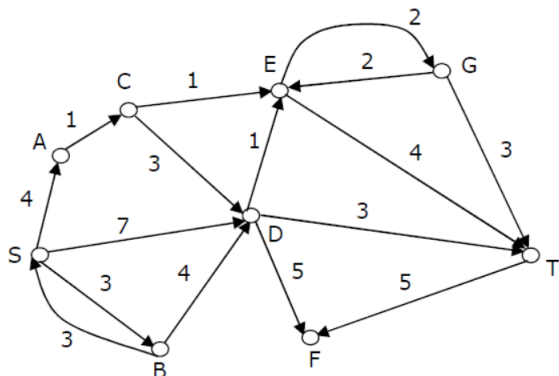
16. Given the post-fix notations (binary tree): $ABC/ - AK/L - *$;Find the pre-fix notation

- A. $* - A/BC/ - AKL$
 - B. $* - A/BC - /AKL$
 - C. $* - /ABC - /ALK$
 - D. $* - A/BC - /LAK$

17. If $P(A|C) > P(B|C)$ and $P(A|\bar{C}) > P(B|\bar{C})$ then:

- A. $P(A) > P(B)$
 B. $P(A) = P(B)$
 C. $P(A) \geq P(B)$
 D. $P(A) \leq P(B)$

18. Consider the following graph G_7 in order to find the shortest paths from vertex S to the others by **Dijkstra** algorithm. The shortest path from S to T is (path; value) ?



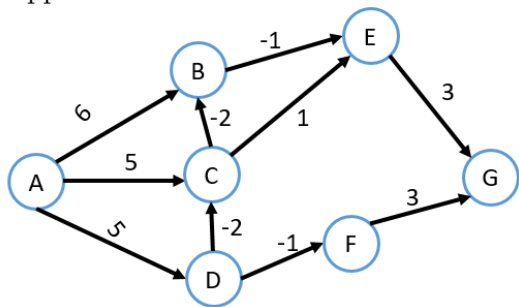
- A. $S \rightarrow A \rightarrow C \rightarrow D \rightarrow T$; 11
 B. $S \rightarrow D \rightarrow T$; 10
 C. There are more than one shortest path from S to T with the weight is 10
 D. The minimum weight is 9

19. A graph $G = (V, E)$ satisfies $|E| \leq 3|V| - 6$. The min-degree of G is defined as $\min \{degree(V)\}$. Therefore, min-degree of G cannot be

- A. 3 B. 4 C. 5 D. 6

Questions from 20–21, consider the following graph G_8 in order to find the shortest paths from vertex A to the others by **Bellman-Ford** algorithm.

Suppose that columns in the tracing table are ordered (from left to right) in alphabetical order (i.e., $A \rightarrow B \rightarrow \dots$). Suppose that the initialization row corresponds to step 0.



20. Which of the following is the shortest path from A to G ?

- A. $A \rightarrow C \rightarrow B \rightarrow E \rightarrow G$; total weight = 5
- B. Exists a shortest path from A to G with the total weight is 3
- C. None of the above answers is correct
- D. There exists a circle of negative length

21. Running the algorithm, which is obtained for step 4 ?

- A. 0; 1; 3; 5; 2; 4; 7 B. 0; 1; 3; 5; 0; 4; 3 C. 0; 1; 3; 5; 0; 4; 5 D. 0; 3; 3; 5; 5; 4; ∞

22. The degree sequence of a simple graph is the sequence of the degrees of the nodes in the graph in decreasing order. Which of the following sequences can not be the degree sequence of any graph?

- (I) 7,6,5,4,4,3,2,1 ; (II) 6,6,6,6,3,3,2,2 ; (III) 7,6,6,4,4,3,2,2 ; (IV) 8,7,7,6,4,2,1,1

- A. I and II B. III and IV C. IV only D. II and IV

23. Which of the following statements is correct?

- A. If G is a simple graph with n vertices with $n \geq 3$ such that the degree of every vertex in G is at least $n/3$, then G has a Hamiltonian circuit.
- B. If G is a simple graph with n vertices with $n \geq 3$ such that $\deg(u) + \deg(v) \geq n/2$ for every pair of non-adjacent vertices u and v in G , then G has a Hamiltonian circuit.
- C. Both of them are in-correct
- D. Both of them are correct

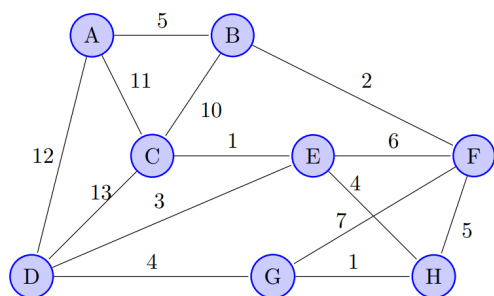
24. Given a binary tree where its pre-order traversal is 1, 2, 4, 5, 3, 6 and its in-order traversal is 4, 2, 5, 1, 6, 3. Determine post-order traversal of this tree

- A. 4, 5, 2, 3, 6, 1
- B. 4, 2, 3, 5, 6, 1
- C. 4, 6, 3, 2, 5, 1
- D. Another solution

25. Which of the following combination can uniquely identify a tree.

- A. In-order and Pre-order
- B. Post-order and Pre-order.
- C. A and B are correct
- D. Non of them

Questions from 26–27, use the following graph G_4 .



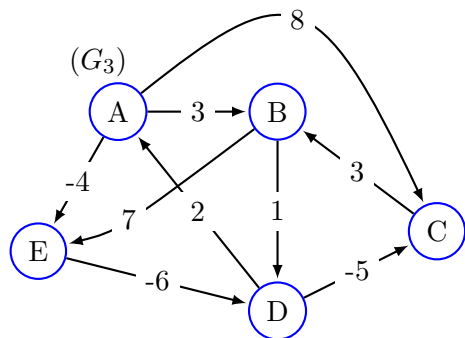
26. How many minimal spanning tree can be found by using Kruskal's algorithm?

- A. 2
- B. 5
- C. 3
- D. 1

27. The total weight of minimum spanning trees found by Prim's/ Kruskal's algorithms is

- A. 21
- B. 30
- C. 41
- D. Tất cả đều sai

28. Apply Floyd-Warshall algorithm and determine the stopping matrix for the following graph



- A. $L^{(3)}$
- B. $L^{(4)}$
- C. $L^{(5)}$
- D. $L^{(2)}$

29. The number of emails arriving in HCMUT's email server each day is a random variable W getting value $w > 0$ (unit 10 emails). We scale W by a discrete random variable X and sort values of X in ascending order. The values of W and X indicate the server's load and are shown in the below table:

W	$0 < w \leq 100$	$100 < w \leq 800$	$800 < w \leq 2000$	$2000 < w$
X	0	1	2	3
$P[X = x]$	a	b	0.2	0.05

The densities $P[X = x]$ are estimated using historical data, and code $X = 0$ means very light load, $X = 1$ means light load, $X = 2$ means medium load and $X = 3$ is high load. You know further that $\mathbf{E}[X] = 1$. Then the pair (b, a) is

- A. $(b, a) = (0.3, 0.45)$
- B. $(b, a) = (0.4, 0.35)$
- C. $(b, a) = (0.35, 0.4)$
- D. $(b, a) = (0.45, 0.3)$

30. The probability for a hen giving an egg per day is 0.6. What is the minimum number of feeded hens in order to obtain in daily average not less than 30 eggs?

- A. 40.
- B. 45.
- C. 50.
- D. 55.

Solution 2210

1. A.
2. C.
3. B.
4. A.
5. A.
6. A.
7. D.
8. A.
9. C.
10. A.
11. A.
12. B.
13. D.
14. D.
15. D.
16. B.
17. A.
18. C.
19. D.
20. B.
21. C.
22. D.
23. C.
24. D.
25. A.
26. A.
27. A.
28. A.
29. D.
30. C.