Daffodil International University
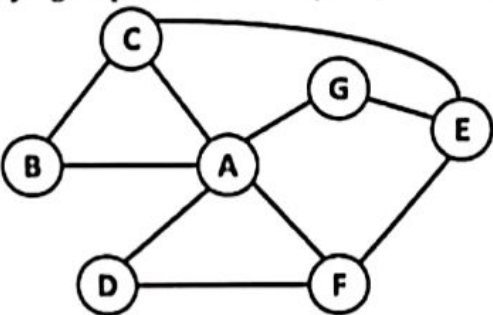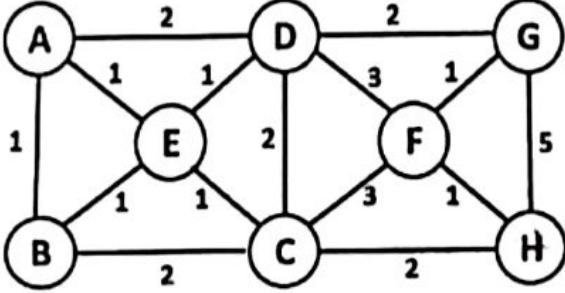### Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Term Examination, Spring-2024
Course Code: CSE213 Course Title: Algorithms
Level: 2, Term: 1, Batch: 64

**Exam Duration: 2.0 Hours**   **Marks: 40**

Answer ALL Questions
[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1. You are given two sequences of characters. Apply an appropriate algorithm to find out the Longest Common Subsequence of the given sequences (Show detailed simulation step-by-step). Write down the common subsequence(If there are multiple common subsequences write all of them) DAFFODILUNI DHAKAUNI	[5]	CO2
2. Tara is a brilliant girl and mostly likes mathematics a lot. One day she and you(her best friend) were sitting on the couch and counting coins that she saved from her monthly pocket money. She had mostly 1 taka coin, 2 taka coin, 5 taka coin and 7 taka coin and she has unlimited amounts of these taka coins. Her father saw that she was counting coins so he came and asked her how many ways she can make 11 taka using all of these coins. But she alone can't do this calculation. so she asked for your help as you are a good mathematician. Help her by applying an appropriate algorithm to find out how many ways you can make 11 taka using 1,2,5 and 7 taka coins (Show detailed steps).	[6]	CO3
3. You are given an undirected graph below. Show the detailed steps and find out whether node E is present in the graph or not by applying Depth First Search(DFS). Start Node: A	[5]	CO2
4. You are given an undirected graph. Convert this graph into a tree by applying the MST algorithm(Prim's) and show all necessary steps.	[6]	CO2

5. Mr. Jo Leyung is always short on time. He is currently in courier service and delivers parcels from door to door. But he loves his family very much. He really wants to find some time for his family. Only way to find that is to somehow minimize his delivery times. Now for the given graph below each vertex represents the places he delivers parcels and each edge is the time needed to reach from one place to another. He wants your help to find out the minimum possible time to reach from one place to another. As he is unable to inform you of a definite starting point you have to help him to find the minimum time from any one of the locations to another. Which algorithm will you choose?Apply the algorithm and show the necessary simulating steps. [Starting node: A]
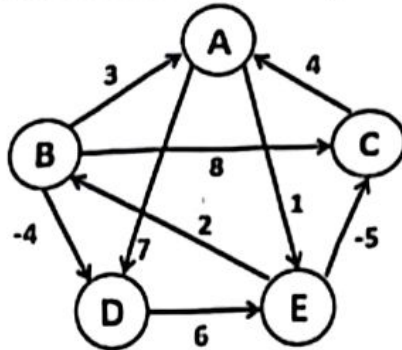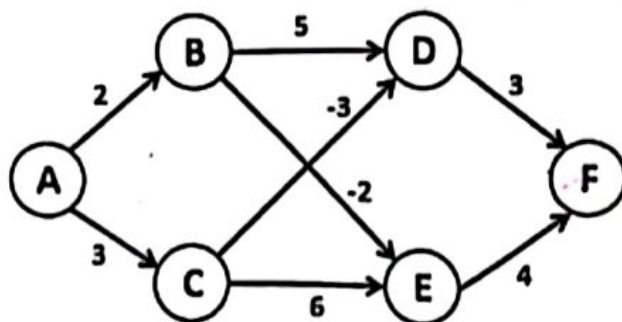
[6] CO3

6. You are given a directed graph. Apply an appropriate algorithm to find the strongly connected components of the given graph (Show all the necessary steps).
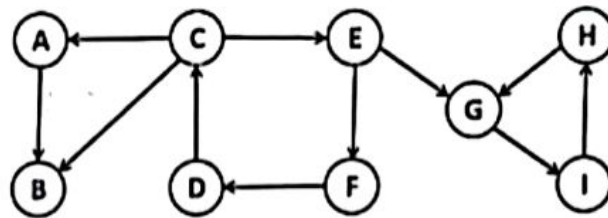
[6] CO2

7. Imagine you're managing a delivery service in a city with a network of roads connecting various neighborhoods. Your task is to find the shortest route for a delivery truck to reach its destination from the distribution center. However, some roads have tolls, while others offer discounts for quick delivery. The road network is represented as a weighted graph, where the vertices represent neighborhoods and the edges represent roads between them. The weight of each edge represents the time it takes to travel that road, including tolls or discounts. However, due to recent policy changes, some roads now have negative weights, indicating a discount for using them. Your challenge is to find the shortest path for the delivery truck from the distribution center to its destination, considering both positive and negative edge weights. Keep in mind that negative edge weights may lead to opportunities for shortcuts, but they can also introduce complexities such as the possibility of negative cycles. Apply an appropriate algorithm to find the shortest path from A to other nodes. [Show necessary steps]

[6] CO3

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Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring-2024
Course Code: CSE212   Course Title: Discrete Mathematics
Level: 2   Term: 1   Batch: 64

Exam Duration: 02 Hours   **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]
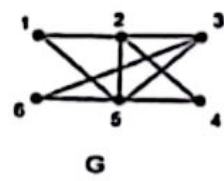
1.	Consider the following adjacent matrix where a, b, c, d, e and f are the vertices of an undirected graph.	CO3

	a	b	c	d	e	f
a	1	1	3	0	0	0
b	1	0	2·	2	0	9
c	3	2	0	4	0	3
d	0	2	1	0	9	1⁻
e	0	0	0	9	0	1
f	0	9	3	1	1	0

a)	Construct a graph from the given matrix.	[2]
b)	Prove handshaking theorem for the graph.	[3]
c)	Prove whether the following graphs G and H are isomorphic or not?	[5]

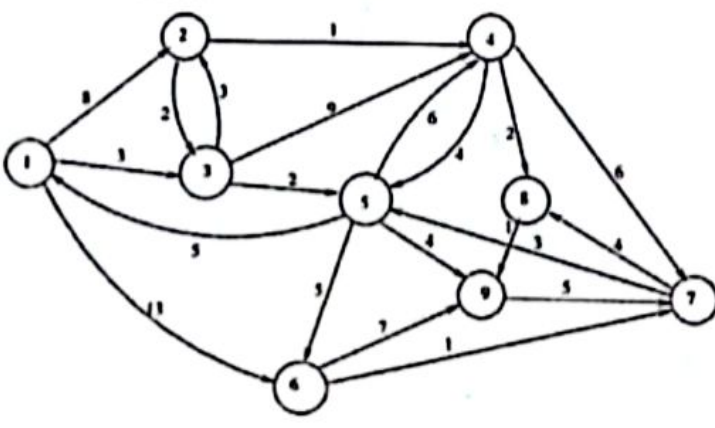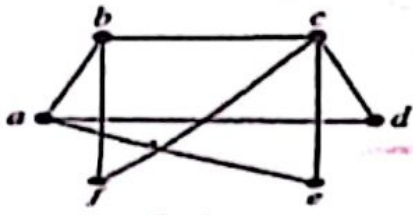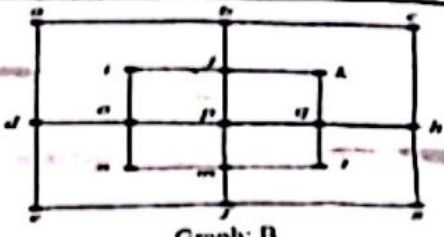G   H

2. a)	Derive a relation from the graph and find whether the relation is reflexive, symmetric, antisymmetric and transitive. If not make at least one relation putting the pair which are needed.	[5] CO2

b)	Prove that $2 - 2.7 + 2.7^2 - \cdots \ldots \ldots \ldots \ldots + 2.(-7)^n = (1 - (-7)^{n+1})/4)$ whenever n is a nonnegative integer. [5] 5

$1 - \dfrac{(-7)^{n+1}}{4}$ $\dfrac{-12}{4}$

3. a)	Draw the following graphs and also find out the degree of each vertices of the graphs.	[5]	CO3

i. $K_{4,7}$

ii. W_5

b)	Apply coloring algorithm to show whether the graphs are bipartite or not.	[5]

Graph: A

Graph: B

4.	Suppose that the nodes of Graph G are {a, b, c, d, e, g, h} and the weights of the edges in G are given in the following matrix. Here, the symbol (*) when there is no edge between a given pair nodes.		CO3

	a	b	c	d	e	f	g	h
a	0	4	5	*	1	2	1	5
b	4	0	1	3	*	1	8	15
c	5	1	0	9.	2	*	4	7
d	*	3.	9	0.	8	2	4	6.
e	1	*	2	8	0	*	*	10
f	2	1	*	2.	*	0	5	8
g	1	8	4	4.	*	5	0	*
h	5	15	7	6	10	8	*	0

a)	Now, Apply Prim's algorithm, starting at node a, to construct a minimum spanning tree and find the weight based on the given matrix.	[5]

b)	Apply Dijkstra on this weighted graph to find the shortest path from a to h.	[5]

Rifat Parvej Tranto
CSE-64

Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring 2024
Course Code: MAT211, Course Title: Engineering Mathematics
Level: L2   **Term: T1**   **Batch: 64**

Time: 2 Hrs

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.

a) Solve $x^3 \dfrac{d^3 y}{dx^3} + 3x^2 \dfrac{d^2 y}{dx^2} + x \dfrac{dy}{dx} + y = x \ln x$.   [7]

      CO2

b) Identify y_p for the ODE $D^3 y - 2Dy + 4y = e^t \cos x$.   [4]

2.

a) Evaluate $\mathcal{L}\{4\cos^2 t + 3\sin^2 t\}$.   [5]

      CO3

b) Evaluate $\mathcal{L}\{e^{2t} \sin 2t \cos 2t\}$.   [6]

3.

a) Determine the value of $\mathcal{L}^{-1}\left\{\dfrac{1}{s^2 - 4s + 3}\right\}$ using convolution theorem.   [5]

      CO3

Determine $f_s(n) + f_c(n)$ for $F(x) = e^{-2x} + e^{4x}$, $0 < x < \infty$.   [6]

4.

Solve $Y''(t) + 4Y(t) = \cos t$, $Y(0) = Y'(0) = 0$.   [7]   CO4

Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring-2024
Course Code: BNS101   Course Title: Bangladesh Studies
Level: 2   Term: 1

Marks: 40

Exam Duration: 2 Hours

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	Six-point Programme was a bold protest against the endless discrimination against East Pakistan and so it aspired to remove the disparity between the two wings of Pakistan. **Summarize** the underlying rationale behind the six demands made in the six-point movement and their significance as the *Charter of Freedom* for Bangalees.	10	CO3
2.	The economy of Bangladesh is currently under stress. **Assess** the current economic scenario of Bangladesh in light of various macroeconomic variables with evidence as per your understanding. **Recommend** some effective measures to develop the economy of Bangladesh.	10	CO4
3.	Environmental degradation in the cities of Bangladesh is mostly caused by unplanned urbanization. **Analyze** the various social and economical factors behind environmental degradation in Bangladesh. **List-out** some practical IT-based solutions for sustainable smart-city development in Bangladesh.	10	CO5
4.	ICT has been declared as the thrust sector by the Government of Bangladesh. **Identify** the strengths and opportunities of Bangladesh's IT industry. If you were the Minister of Information and Communication Technology, what would you do to **solve** the current challenges of IT sector in Bangladesh?	10	CO5

Rifat Parvej Pranto
CSE_64

Daffodil International University
Faculty of Science and Information Technology
Department of Computer Science and Engineering
Final Examination, Spring-2024
Course Code: AOL101 Course Title: Art of Living
Level: 2   Term: 1

Exam Duration: 2 Hours

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes]

1.	In Bangladesh's booming IT sector, programming languages are crucial for developers to land jobs. Staying updated on emerging technologies like AI and machine learning gives Bangladeshi IT professionals a competitive edge in the global market. **Explain** the importance of technological skills in the IT industry? Additionally, **outline** some skills that you think are essential to secure a job in this field.	10	CO1
2.	Rahim and Karim are very good friends. One-day Karim notices, Rahim is unmindful and disappointed. Karim came to Rahim and asked the reason. Rahim says he is very enthusiastic to participate in the National Hackathon but he is afraid of being a presenter. Understanding the situation, Karim laughs reassuringly and offers Rahim some helpful tips and tricks to overcome their presentation anxiety. Rahim also wants to know the estimating ways to deliver a good presentation physically. **List** the ways by which Rahim effectively overcome presentation anxiety and keep the audience engaged?	8	CO2
3.	Rahul is so much influenced in social media. He wastes a lot of his time and energy in virtual interactions. Rahul's dream is to become a top influencer in Bangladesh. But he has not fixed out the way to start his journey as an influencer. Rahul enrolled in a course titled "Walking Virtually". a) As a course instructor now **Assume** some ideas to guide Rahul to use media literacy for achieving success in social media initiatives.	4	
	b) **Analyze,** how adaptation of new technology can positively impact his journey.	3	

4.	Rimi is a graphic designer at a marketing agency. She's consistently delivered high-quality work on time, exceeding client expectations. However, a new project requires her to collaborate with a teammate, Sakib, who often misses deadlines and produces subpar work. This puts a strain on Rimi as she has to pick up the slack to ensure the project's success.		CO3
	Defend, how Rimi can uphold her strong work ethic and integrity while navigating a challenging collaborative environment with Sakib to ensure the project's success and maintain a positive team dynamic.	7	
5.	Evaluate the course "Art of Living" in 8 points. Determine its impact in shifting your attitude towards life.	8	

Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science and Engineering
Final Examination, Spring-2024

Course Code: CSE215, Course Title: Electronic Devices and Circuits

Level: 2   Term: 1   Batch: 64

Time: 2 Hours   **Marks: 40**

Answer ALL Questions

The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.

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1.	a)	Name the conditions must be satisfied to achieve faithful amplification.	[1]	CO1
	b)	Define gain in transistor amplifier.	[1]	
	c)	List the characteristics of an ideal op amp.	[1]	
	d)	Recall the functions of coupling capacitor in transistor amplifier.	[1]	
	e)	Relate the relation between V_{in} and V_{out} for a summing op-amp circuit.	[1]	
2.	a)	Illustrate the transfer characteristic graph for n-channel D-MOSFET and explain its characteristics.	[5]	CO2
	b)	Explain how negative feedback affects the gain of an amplifier. Also **Interpret** it from the Gain of Negative Voltage Feedback Amplifier with neat figure.	[5]	
	c)	Demonstrate the circuit operation of the Hartley Oscillator with the proper circuit diagram and show the feedback fraction of that oscillatory circuit.	[5]	
3.	a)	Utilizing the transfer characteristic of JFET shown in Fig. 2, determine the minimum value of V_{DD} required to put the device in the constant-current region of operation for the JFET in Fig. 1.	[5]	CO3

Fig. 1

Fig. 2
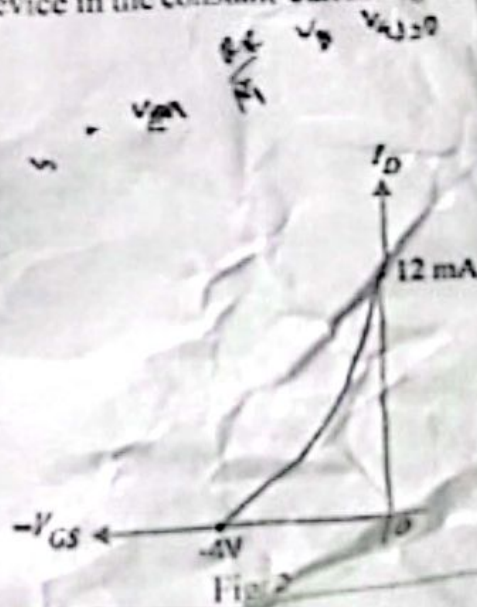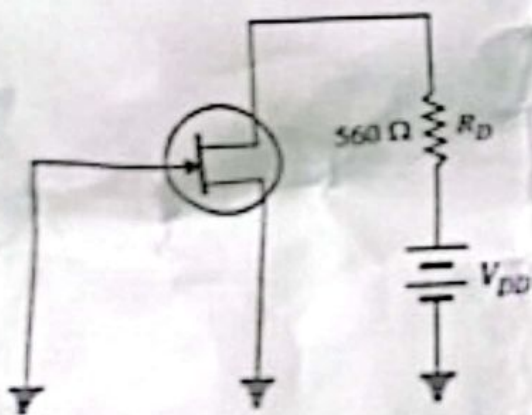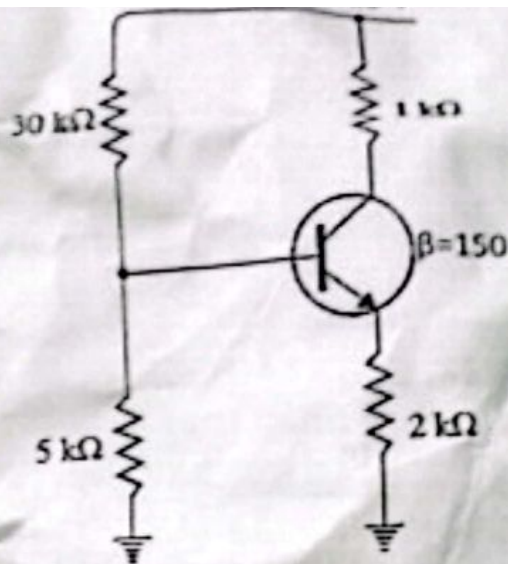
Fig. 3

Applying Potential divider method in the above CE amplifier, find the operating point. Assume the transistor to be of silicon.

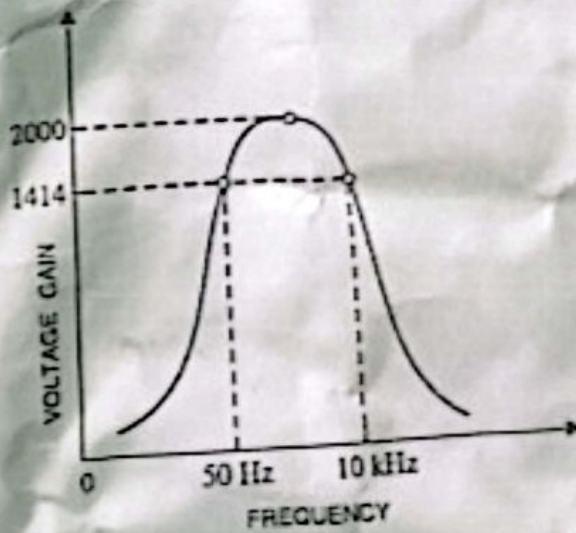|		
c)	An amplifier has a voltage amplification A_v and a fraction m_v of its output is feedback in opposition to the input. If m_v= 0.01 and A_v= 110, **Solve** for the percentage change in the gain of the system if A_v falls 8 db due to ageing.	[5]
d)	For a Colpitts Oscillator the value of C_1=0.001µF, C_2=0.01µF, L=15µH. **identify** the operating frequency for this oscillator.	[2]
e)	**Select** the (a) Bandwidth (ii) Lower cut-off frequency (iii) Upper cut-off frequency from the given frequency response in fig. 4.	[3]

Fig. 4

Good Luck!!!