

Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024
Course Code: MAT102; Course Title: Mathematics II
Sections: 42 (All)

Time: 1 Hour 30 Minutes

Marks: 25

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.	Explain Identity, Permutation, Involuntary, Symmetric and Hermitian matrix with an example.	5×1=5	CLO-1 L-2
2.	a. Analyze the nature of the trace of a completely non-zero Skew-Hermitian matrix. b. Analyze the relation between the inverse of an orthogonal matrix with its transpose. c. Analyze the rank of the matrix $25I_{150}$.	3×1=3	CLO-2 L-4
3.	$A = \begin{pmatrix} 2 & 1 & 3 & 4 \\ 0 & 0 & 0 & 0 \\ 3 & 1 & 2 & 3 \\ 1 & 6 & 1 & 3 \\ 6 & 0 & 1 & 1 \end{pmatrix} \quad B = \begin{pmatrix} -1 & 5 & -3 \\ 3 & -1 & 0 \\ 4 & -2 & 7 \end{pmatrix}$ a. Compute $ B $ by using the cofactor method along 2 nd column. b. Construct the inverse matrix of B , and verify it. c. Determine the rank of A .	2 3+1=4 4	CLO-3 L-3
	Answer question 4 and 5 based on the following: The following diagram describes the traffic flow of a congested area of a city on some day.		
4.	Illustrate the system of linear equations from the above scenario.	2	CLO-3 L-3
5.	Figure out the solution of the system for unknown flow rates.	5	CLO-4 L-4

Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024

Course Code: SE123; Course Title: Discrete Mathematics

Sections: All Teachers: MAK, RM, MI2, MJ

Time: 1 Hour 30 Mins

Marks: 25

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.]

<p>1 Explain if the propositional statements are logically equivalent or not. You must justify your answer.</p> <p>(a) (1) Justify it : $(J \wedge K) \equiv (\neg J \wedge K \wedge L)$</p> <p>(2) Justify it : $(C \vee (D \wedge E)) \equiv (C \vee D) \wedge (C \vee E)$</p> <p>(b) (1) Justify it : $(G \wedge (G \rightarrow H)) \equiv (\neg G \wedge (H \rightarrow G))$</p> <p>(2) Justify it : $(S \vee \neg T) \equiv (T \vee \neg S)$</p> <p>(C) Justify that $M \leftrightarrow N$ is equivalent to $(M \rightarrow N) \wedge (N \rightarrow M)$</p> <p>(D) What does Inverse & X-NOR? Assume a state for 2 variables and justify it by the Truth table.</p> <p>(E) Justify the De Morgan's Law : $\neg(O \vee P) \equiv \neg O \wedge \neg P$</p>	<p>[Marks-10]</p>	<p>CLO-1 Level-2</p>
<p>2 Translate the sentence into predicate logic for question (a).</p> <p>a) "For every student, if they have a smart device, then they can access the internet to find relevant information."</p> <p>b) M (a, b, c): $a = b + c + 3$. What is the truth value of the proposition M (2, 3, and 4) and M (2, 4, and 7)?</p>	<p>[Marks-5]</p>	<p>CLO-2 Level-2</p>
<p>3 X is the set of positive factors of 4. Y is the set of prime factors of 3. Z is the set of positive proper factors of 5. M is the set of positive factors of 6.</p> <p>Apply the Set theory concept and illustrate what type of relation is possible from these sets (at least four relations should be expressed with explanation).</p>	<p>[Marks-5]</p>	<p>CLO-2 Level-3</p>
<p>4 $A = \{x \mid x \text{ is an integer and } 1 \leq x \leq 10\}$</p>	<p>[Marks-5]</p>	<p>CLO-2 Level-3</p>

$$B = \{x \mid x \text{ is an integer and } 5 \leq x \leq 25\}$$

Calculate the following by applying Set theory Concept:

- a) Set of all positive even numbers from A set.
- b) Set of prime Numbers less than 20 from B set.
- c) Are Set A & B an equal set or not show it with justification.

Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Mid Term Examination, Fall 2024
**Course Code: PHY 101; Course Title: Physics-I: General Mechanics,
Waves and Oscillations, Optics and Atomic and Modern Physics**
Sections & Teachers: (A-K) & (SH, SAR)

Time: 1 Hour 30 Mins

Marks: 30

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.]

- | | | | |
|----|---|-------|-----------|
| a. | List the key concepts related to moment of inertia. | [1.5] | CLO-
1 |
| b. | Draw and describe a graph that represents the relationship between force and friction. | [2] | |
| c. | Retrieve how a transverse wave is different from longitudinal waves. | [1.5] | CLO-
2 |
| a. | Compute the expression for differential equation of a particle executing SHM | [3] | |
| b. | Estimate mathematical expression for a standing wave. | [3] | CLO-
3 |
| c. | Approximate the mathematical expressions for different parameters (trajectory, range, maximum height) involved in a projectile motion. | [4] | |
| a. | A SHM is represented by the equation $y=10\sin(10t-(\pi/6))$. Calculate (i) time period (ii) maximum displacement (iii) maximum velocity and maximum acceleration (iv) displacement, velocity and acceleration at time $t=1\text{sec}$. | [4] | CLO-
3 |
| b. | A projectile is launched with an initial speed of 20 m/s at an angle of 30 degrees above the horizontal from a height of 40 meters. Compute: (i) The time and range it takes for the projectile to hit the ground. (ii) velocity of the ball when it reaches the ground | [3] | |
| c. | A particle moves in a circle of radius 10 m. Its linear speed is given by $v = t^2 + 2t$. (i) Compute the centripetal and tangential acceleration at $t = 3\text{s}$ (ii) Calculate the angle between the resultant acceleration and the radius vector. | [3] | |

Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024

Course Code: SE212; Course Title: Software Requirement Specification & Analysis

Sections & Teachers: (A)-TRT,(B,C,D)-AR, (E,F,G)-FRR, (H,I)- MSA, (J,K)-RT

Time: 1 Hour 30 Mins

Marks: 25

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.]

Scenario 01:

ReliefAid.com is a disaster management platform developed by the **Bangladesh Disaster Relief Coordination Board (BDRCB)**, in partnership with NGOs and local authorities, to enhance relief efforts during natural disasters, such as the recent floods that affected multiple districts in Bangladesh. This platform aims to streamline volunteer management, food relief operations, and resource allocation by providing real-time updates on affected areas, tracking the status of rescue efforts, and identifying regions in need of aid. Users can view which type of relief (e.g., food, medical, shelter) is most needed and monitor ongoing efforts. It also features an interactive map displaying safe houses and shelters for displaced individuals. Volunteers can register, coordinate activities, and report progress, ensuring a smoother and more efficient response to disasters. By connecting all key stakeholders, ReliefAid.com helps direct resources where they are most needed, ensuring timely aid delivery and support.

1.	a)	Summarize feasibility analysis based on the given case above.	[Marks-3]	CLO-1 Level- 2
	b)	Interpret the key Non-Functional requirements for this system.	[Marks-3]	
	c)	Characterize a user profile for “volunteer.”	[Marks-5]	
2.	a)	Associate suitable elicitation technique/s for requirement gathering and explain the reason behind choosing it.	[Marks-4]	CLO-2 Level-2
	b)	Interpret software requirement specifications for the above scenario.	[Marks-5]	
3.	a)	Construct a use case diagram based on the SRS that you listed in Q.2.b.	[Marks-5]	CLO-3 Level-3

Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024

Course Code: SE 121; Course Title: Structured Programming
Sections & Teachers: ALL

Time: 1 Hour 30 Mins

Marks: 25

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.	<p>a) Define header files in C programming. Describe the rules for valid and invalid identifiers in C with examples.</p>	[Marks-5]	CLO-1 Level-1
	<p>b) Consider the following C program,</p> <pre>#include <stdio.h> int main() { int a = 15, b = 7, c; c = (a - b) / 2 + b; printf("The value of c: %d\n", c); a *= 3; printf("The value of a: %d\n", a); a++; c = a % (b + 5) / b + b; printf("The updated value of c: %d\n", c); return 0; }</pre> <p>Interpret the output of the program and explain how the arithmetic and assignment operators are applied in the calculations.</p>	[Marks-5]	CLO-1 Level-2
2.	<p>a) Examine the following code for any errors and rewrite the code with the necessary corrections.</p> <pre>#include <stdio.h> int main() { int number sum = 0; printf("Enter a number: "); scanf("%d", number); while (number != 0) sum += number % 10;</pre>	[Marks-5]	CLO-2 Level-3

	<pre> number /= 10; } printf("Sum of digits is: %d/n", sum); return 0 } </pre>					
b)	<p>A school is interested in helping students learn about even and odd numbers. The objective is to calculate the sum of all even numbers and the sum of all odd numbers within a given range defined by two positive integers. Refer to the sample input and output below for a clearer understanding.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Sample Input:</td><td style="padding: 5px;">Sample Output:</td></tr> <tr> <td style="padding: 5px; vertical-align: top;">5 9</td><td style="padding: 5px; vertical-align: top;">The sum of Even Numbers: 14 The sum of Odd Numbers: 21</td></tr> </table> <p>Articulate the steps required to build the program and solve this logic using the C programming language.</p>	Sample Input:	Sample Output:	5 9	The sum of Even Numbers: 14 The sum of Odd Numbers: 21	[Marks-5]
Sample Input:	Sample Output:					
5 9	The sum of Even Numbers: 14 The sum of Odd Numbers: 21					
c)	<p>Construct a C program based on the following scenario,</p> <p>In rural Bangladesh, people often calculate how much money they need to save depending on the number of animals they own, like cows or chickens. Different types of animals require different amounts of savings for their care.</p> <p>Your task is to create a simple system that calculates the total savings needed based on the number of animals and their respective care costs.</p> <ul style="list-style-type: none"> ● If the user owns 1 cow - Add 5000 taka to the savings. ● If the user owns 2 cows - Add 10,000 taka to the savings. ● If the user owns 3 or more cows - Add 15,000 taka to the savings. ● If the user owns 1 chicken - Add 100 taka to the savings. ● If the user owns 2 chickens - Add 200 taka to the savings. ● If the user owns 3 or more chickens - Add 300 taka to the savings. <p>If the input is invalid, such as a negative number of animals, display: "Please enter a valid number."</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Sample Input:</td><td style="padding: 5px;">Sample Output:</td></tr> <tr> <td style="padding: 5px; vertical-align: top;">2 5</td><td style="padding: 5px; vertical-align: top;">Total savings: 10300</td></tr> </table> <p>Explanation: For the first sample, the first input is 2 which is the number of cows and the second input is 5 which is the number of chickens. $2 \text{ cows} = 10,000 \text{ taka}$ $5 \text{ chickens} = 300 \text{ taka}$ $\text{So total savings are } = (10000 + 300) = 10300$</p>	Sample Input:	Sample Output:	2 5	Total savings: 10300	[Marks-5]
Sample Input:	Sample Output:					
2 5	Total savings: 10300					

Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2024

Course Code: SE 213; Course Title: Digital Electronics & Logic design
Batch: 42 Batches (All); SP, NIR, MBM, SA, SI

Time: 1:30 Hrs

Marks: 25

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)	i) Subtract the binary numbers using 2's complement method. $100101 - 110011$ ii) Add the binary addition of the following number: $(111011)_2 + (10111)_2$	[Marks-2+2]	CLO-1 <i>Level-2</i>
	b)	Convert the following numbers: i) $(9AF3.31A)_{16} = (?)_8$ ii) $(179.1101)_{10} = (?)_2$	[Marks-3]	
	c)	Discuss the truth table and logic circuit of the following expression: $F = A'B [C(AB + BC) + ABC]$	[Marks-3]	
2	a)	How can you demonstrate that a NAND gate can be used to implement all other basic logic gates, justifying its classification as a universal gate?	[Marks-4]	CLO-2 <i>Level-3</i>
	b)	$F(A, B, C, D) = \sum(0, 4, 8, 9, 10, 12, 13, 14)$ Apply k-map simplification technique to simplify the above expressions. Construct the logic diagrams of the simplified output.	[Marks-5]	
	c)	Express a full-adder using sum of products.	[Marks-6]	



Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Spring 2025

Course Code: SE212; Course Title: Software Requirements Specification & Analysis

Sections & Teachers: All

Time: 1 Hour 30 Mins

Marks: 25

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.]

Anushka, a university professor, planned to attend an international conference in Singapore. With her busy schedule, she decided to book her flight through an online airline platform. One evening, she opened the app, which displayed a clean and easy-to-navigate interface. She entered her departure city, Dhaka, destination, Singapore, and travel dates. Within seconds, the app displayed available flights from different airlines, along with prices, departure times, and flight durations. After comparing options, Anushka selected a morning flight with Air Sky. The app guided her to the next step, where she entered her personal details, including her passport number, contact information, and meal preferences. Since she preferred a window seat, she selected one using the seat map feature. For additional convenience, she added extra baggage and travel insurance. Moving to the payment section, Anushka chose to pay using her credit card. The system ensured her payment was secure by encrypting her financial information. After completing the transaction, she received an email and SMS confirmation with her e-ticket and flight itinerary. On the day of her journey, Anushka used the app to check in online and download her boarding pass, saving time at the airport. She also tracked real-time flight updates to ensure her flight was on schedule. At the airport, she swiftly passed through security and found her gate. While boarding, the airline's digital system verified her ticket using a QR code, streamlining the process. After a smooth flight, she landed in Singapore and received an app notification with luggage carousel information. Throughout her experience, Anushka appreciated the system's reliability, ease of use, and real-time updates. The secure payment process, intuitive seat selection, and instant notifications made her journey stress-free, demonstrating how technology can simplify air travel from booking to arrival.

1.	a)	Analyze the given scenario and articulate the functional and non-functional requirements for the system, explaining how they support its intended functionalities and user experience.	[Marks-6]	CLO-1 Level-2
	b)	Describe the user profile of Anushka and illustrate her smooth interaction with the system.	[Marks-5]	
2.	a)	Interpret an appropriate elicitation technique for the system described in the scenario and justify your choice with a detailed explanation of how it will effectively gather the necessary requirements.	[Marks-6]	CLO-2 Level-2
	b)	Discuss the drawbacks of alternative elicitation techniques that you decided not to use during the requirement collection phase and explain why they were less suitable for this scenario.	[Marks-3]	
3.	a)	Draw a use case diagram based on the air ticket booking and traveling system scenario provided. Identify key actors, use cases, and system interactions that demonstrate the process from booking a ticket to completing the journey.	[Marks-5]	CLO-3 Level-3



Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Spring 2025

Course Code: SE 121; Course Title: Structured Programming

**Sections & Teachers: MTK(A, B), SA (C), SCS (D, E), AHZ (F, G) MSA (H), MR (I, J, M),
JIC (K, L), MSSS (N), ST (O), MRN (P), NML (Q)**

Time: 1 Hour 30 Mins

Marks: 25

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.]

	<p>1. a) Explain the output of the following expressions.</p> <p>(i) int x = 5; int y = x++ + 3; printf("%d", y);</p> <p>(ii) x = (5 < 8 && 15 > 8) 5 == 5; printf("%d", x);</p> <p>b) Observe any errors in the following code and rewrite it with the necessary modifications.</p> <p>(i) <code>#include <stdio.h> int main() { int x = 5; float y = 3.14; y = x * y; printf("Multiplication: %.2f\n", y); return 0; } (ii) <code>#include <stdio.h> int main() { int a = 3; a=-; printf("%.2d\n", result); return 0; }</code></code></p> <p>2. a) Suppose you are tasked with developing a feedback system for a school based on the student's grades. The system will provide feedback for each grade (A-D) as follows: A: Excellent work! B: Good job!</p>	<p>[Marks-5]</p>	<p>CLO-1 Level-2</p>

	<p>C: You passed, but there's room for improvement. D: You need to work harder.</p> <p>Construct a C program based on the above scenario using a switch-case statement.</p>					
b)	<p>One of your friends goes Eid shopping and receives money from his father, mother, and brother. He plans to buy clothes and can pay either in cash or through mobile banking. If he chooses cash payment, he pays the full amount with no discount. However, if he pays using mobile banking, he gets a 15% discount on his total purchase.</p> <p>Code a C program that takes input for the amount received from the father, mother, and brother, the purchase amount, and the payment method (1 for Mobile Banking, 0 for Cash). The program should calculate and display the total money available, the final amount after applying the discount (if any), and the remaining money after shopping.</p> <table border="1"> <thead> <tr> <th>Sample Input</th><th>Sample Output</th></tr> </thead> <tbody> <tr> <td> Enter money from father: 2500 Enter money from mother: 1000 Enter money from brother: 500 Enter purchase amount: 3000 Enter payment method (1 for Mobile Banking, 0 for Cash): 1 </td><td> Total Money Available: 4000 Final Purchase Amount After 15% Discount: 2550 Remaining Money: 1450 </td></tr> </tbody> </table>	Sample Input	Sample Output	Enter money from father: 2500 Enter money from mother: 1000 Enter money from brother: 500 Enter purchase amount: 3000 Enter payment method (1 for Mobile Banking, 0 for Cash): 1	Total Money Available: 4000 Final Purchase Amount After 15% Discount: 2550 Remaining Money: 1450	[Marks-5]
Sample Input	Sample Output					
Enter money from father: 2500 Enter money from mother: 1000 Enter money from brother: 500 Enter purchase amount: 3000 Enter payment method (1 for Mobile Banking, 0 for Cash): 1	Total Money Available: 4000 Final Purchase Amount After 15% Discount: 2550 Remaining Money: 1450					
c)	<p>A person is planning to go abroad for higher studies and needs to save money for travel expenses. He decides to save a fixed amount every month and wants to track his savings over time. Given the starting balance (initial savings), the monthly savings amount, and the number of months,</p> <table border="1"> <thead> <tr> <th>Sample Input</th><th>Sample Output</th></tr> </thead> <tbody> <tr> <td> Enter starting balance: 1000 Enter monthly savings amount: 300 Enter the number of months: 4 </td><td> Month 1: Total Savings = 1300 Month 2: Total Savings = 1600 Month 3: Total Savings = 1900 Month 4: Total Savings = 2200 </td></tr> </tbody> </table> <p>Build a C program to calculate and print the total savings at the end of each month using a for loop.</p>	Sample Input	Sample Output	Enter starting balance: 1000 Enter monthly savings amount: 300 Enter the number of months: 4	Month 1: Total Savings = 1300 Month 2: Total Savings = 1600 Month 3: Total Savings = 1900 Month 4: Total Savings = 2200	[Marks-5]
Sample Input	Sample Output					
Enter starting balance: 1000 Enter monthly savings amount: 300 Enter the number of months: 4	Month 1: Total Savings = 1300 Month 2: Total Savings = 1600 Month 3: Total Savings = 1900 Month 4: Total Savings = 2200					



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Mid Term Examination, Spring 2025

Course Code: PHY 101; Course Title: Physics-I: General Mechanics,
Waves and Oscillations, Optics and Atomic and Modern Physics
Sections & Teachers: (A-D, (E-H,Q), I-L, M-P) & (SH, MRI, MOR, JB)

Time: 1:30 Hrs Marks: 25

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. Define with examples damped vibrations and oscillations. [1.5] CLO-
Level -1
- b. Draw and describe a graph that represents the relationship between force and friction. [2]
- c. Define with real-life examples transverse and longitudinal waves. [1.5]
2. a. Imagine the leaves of a coconut tree swaying in the wind, at the highest bend, they pause for a moment, and in the middle, they move the fastest. Estimate the total energy of the leaves to show that it remains constant at any given moment. [3] CLO-
Level -2
- b. Microwave ovens naturally create uneven heating. The microwaves bounce around and form standing waves, creating hot spots where food heats up quickly and cold spots where it doesn't. Approximate expression how two traveling waves, like those in a microwave, combine to form a standing wave? [3]
- c. Imagine a camera drone capturing a cricket match, following a curved flight path through the sky just like the trajectory of a cricket ball. Using the basic equations of projectile motion and gravity, approximate its peak height and range, confirming that its flight path is a parabola. [4]
3. a. A particle performs simple harmonic motion given by the equation $y = 20\sin [\omega t + \alpha]$. If the time period is 30 seconds and the particle have a displacement of 10 cm at ($t = 0$), calculate (i) epoch; (ii) the phase angle at ($t = 5$) seconds and (iii) the phase difference between two positions of the particle 15 seconds apart. [3] CLO-
Level -3
- b. A Projectile fired horizontally as shown in Fig. a with a speed 98 m/s horizontal from top of a hill of 490m height. Calculate: time to reach ground, distance of the target from hill and impact velocity. ($g=9.8$). [4]

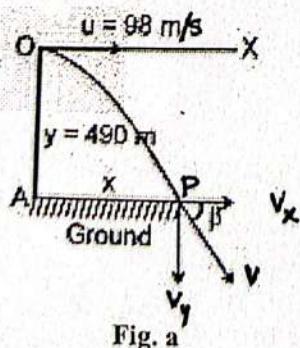


Fig. a

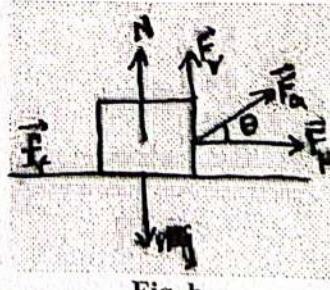


Fig. b

- c. A 70 kg box is pulled by 400 N force at an angle 30 deg with horizontal Fig. b. If the coefficient of sliding friction is 0.5, Calculate the acceleration of the box [3]



Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Midterm Examination, Spring 2025

Course Code: MAT102; Course Title: Mathematics II

Sections: 43 (A-Q), Teachers Initial: MMH, MSU, MIA, NA

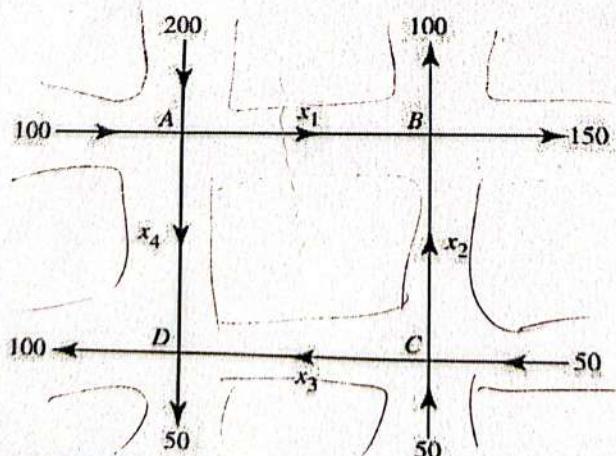
Time: 1 Hour 30 Minutes

Marks: 25

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.	Explain Scaler, Involuntary, Orthogonal, Hermitian, and Nilpotent matrix with an example.	5×1=5	CLO-1 L-2
2.	a. Analyze the nature of the trace of a completely non-zero Skew Hermitian matrix. b. Point out a 5×4 matrix for which REF=RREF=NF. c. Examine the diagonal of $-2I_4 + \frac{1}{2}I_4$.	3×1=3	CLO-2 L-4
3.	$A = \begin{pmatrix} 0 & 1 & 0 & 1 \\ 3 & 0 & 2 & 2 \\ 1 & -1 & 2 & 1 \\ 1 & 0 & 1 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 1 & 1 \\ 0 & 4 & 2 \\ -3 & 8 & 3 \\ 4 & -8 & -2 \end{pmatrix}$		CLO-3 L-3
	a. Compute the rank of A. b. Construct the inverse of B and verify it. c. Determine all the Eigen values and Eigen vectors of the matrix B.	3 4 5	
4.	The following diagram describes the traffic flow of a congested area of a city on some day. Construct the system of linear equations from this scenario. Then, Identify the solution of the system for the unknown flow rates.	5	CLO-4 L-4





Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Summer 2025

Course Code: MAT101

Course Title: Mathematics I

Batch: 44; Section: A-L

Teachers Initial: MMH, DMMK, MIA, GRS

Time: 1 Hour 30 Minutes

Marks: 25

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.	<p>Explain the following with a suitable example</p> <ul style="list-style-type: none">a. Relationb. Bijective Functionc. Homogeneous Function	3×1=3	
2.	<p>a. Compute the domain and range of the following function</p> $f(x) = \frac{2x^2 + 3x + 17}{x^2 - x - 2}$ <p>b. Express the following function graphically and write a comment on its domain and range from the graph</p> $f(x) = x - 2 - x + 3 + x $	3 4	CLO-1 L-2
3.	<p>a. Calculate the non-zero value of k that makes the following function continuous at $x = 0$, then also determine whether the function is differentiable or not at the same point by using the non-zero value of k</p> $f(x) = \begin{cases} \frac{\tan kx}{x}, & x < 0 \\ 3x + k^2, & x \geq 0 \end{cases}$ <p>b. If $u = \tan^{-1}\left(\frac{y+x}{\sqrt{y+x}}\right)$ then show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{4} \sin 2u$</p> <p>c. Compute the derivative of $x^{\sin(\ln(\tan^{-1}\sqrt{ax}))}$ with respect to $a^{bx} \sin^m(rx) + a^m$</p> <p>d. If $y = \ln(a^n x + b^n)$ then calculate the n-th derivative (y_n) of y</p>	5 4 3 3	CLO-2 L-3



Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Summer 2025

Course Code: PHY 101, Course Title: Physics-I

Level: 1 Term: 2 Section: A-L

Instructor: SH(A-D), AEE(E-H,L), MAM(I,J), JB(K)

Duration: 1:30 Hrs

Marks: 25

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. Define with physical significant the terms Center of Mass and Moment of Inertia. [2] CLO-1,
b. Draw and describe a graph that represents the relationship between force and friction. [2] C1
2. a. Explain mathematically why the trajectory of a projectile launched at an angle follows a parabolic path. Consider the forces acting on the projectile and how they influence its motion. [4] CLO-2,
b. Describe using mathematical equation that the total energy of a particle engaged in Simple Harmonic Motion (SHM) remains constant at any given moment. [3] C2
- c. Compare the distinctions between damping and resonance in their application to wave. [1]
- a. Estimate mathematical expression for a standing wave. [3]
- b. A projectile is launched with an initial speed of 20 m/s at an angle of 30 degrees above the horizontal from a height of 40 meters. Compute: a) The time and range it takes for the projectile to hit the ground. b) velocity of the ball when it reaches the ground. [3] CLO-3,
c. The plane surface is inclined at an angle of 50°. A body of mass 15 kg is placed on it. If the value of coefficient of friction μ_k , between the body and the inclined surface is 0.2, calculate the downward acceleration of the body, along the inclined plane surface. (Take $g=15\text{ms}^{-2}$). [3]
- c. A simple harmonic vibration equation is defined by $Y = 5 \sin (60.832t + \phi)$. The displacement at 0 sec is 2cm. Find (i) the epoch (ii) the frequency and (iii) the maximum velocity. [4] C3



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination - Summer 2025
Course Code: SE 121; Course Title: Structured Programming
Sections & Teachers: All (MAK, ZNM, MR, JIC, SCS, AHZ, KFH, AF)

Time: 1.5 Hours

Marks: 25

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.	<p>a) Interpret the output of the program and explain the change of values in each steps.</p> <pre>#include <stdio.h> int main() { int a=10, b=5,c,d; c = a++; d = --b; b = --c; printf("%d\n", a); printf("%d\n", b); printf("%d\n", c); printf("%d\n", d); return 0; }</pre>	[Marks-4]	CLO-1 Level-2		
	<p>b) Rewrite both programs in a correct and compilable form.</p> <table border="1" style="width: 100%;"><tr><td style="width: 50%;">i) <pre>#include<stdio.h> Include <math.h> int main { }() DOUBLE X; X = 8.5; Y = pow(x); printf("%f %f\n ",X,Y); return 0;)</pre></td><td style="width: 50%;">ii) <pre>#include <stdio.h> #define PI 3.14 int main(){ int length=10, width == 5; float area; area = length x.width; printf("The area of rectangle is: %c\n", area); return 0; }</pre></td></tr></table>	i) <pre>#include<stdio.h> Include <math.h> int main { }() DOUBLE X; X = 8.5; Y = pow(x); printf("%f %f\n ",X,Y); return 0;)</pre>	ii) <pre>#include <stdio.h> #define PI 3.14 int main(){ int length=10, width == 5; float area; area = length x.width; printf("The area of rectangle is: %c\n", area); return 0; }</pre>	[Marks-6]	CLO-1 Level-2
i) <pre>#include<stdio.h> Include <math.h> int main { }() DOUBLE X; X = 8.5; Y = pow(x); printf("%f %f\n ",X,Y); return 0;)</pre>	ii) <pre>#include <stdio.h> #define PI 3.14 int main(){ int length=10, width == 5; float area; area = length x.width; printf("The area of rectangle is: %c\n", area); return 0; }</pre>				

2.	a)	<p>Suppose you are a passionate developer and you have told to design a simple restaurant recommendation system that suggests dishes based on the time of day as follows:</p> <ul style="list-style-type: none"> • If the time is between 6 AM and 11 AM - Recommendation is “Pancakes and Coffee” • If the time is between 12 PM and 3 PM - Recommendation is “Chicken Salad” • If the time is between 4 PM and 6 PM - Recommendation is “Samosa and Chai” • If the time is between 7 PM and 10 PM - Recommendation is “Grilled Steak” <p>Solve this logic by writing a program using the C programming language.</p>	[Marks-4]	CLO-2 Level-3								
	b)	<p>Suppose you are tasked to construct a C program that uses a switch-case to calculate the area of a shape based on user choice: 1 = Circle, 2 = Square, 3 = Rectangle. The program should input the required dimensions and display the area. Handle invalid choices properly.</p> <table border="1" data-bbox="330 1019 1123 1327"> <thead> <tr> <th data-bbox="330 1019 715 1064">Sample Input</th><th data-bbox="715 1019 1123 1064">Sample Output</th></tr> </thead> <tbody> <tr> <td data-bbox="330 1064 715 1125">Enter Choice: 1 Enter Radius: 4</td><td data-bbox="715 1064 1123 1125">Area of Circle: 50.265</td></tr> <tr> <td data-bbox="330 1125 715 1215">Enter Choice: 2 Enter One Side: 4</td><td data-bbox="715 1125 1123 1215">Area of Square: 16</td></tr> <tr> <td data-bbox="330 1215 715 1327">Enter Choice: 3 Enter Length: 4 Enter Width: 3</td><td data-bbox="715 1215 1123 1327">Area of Rectangle: 12</td></tr> </tbody> </table>	Sample Input	Sample Output	Enter Choice: 1 Enter Radius: 4	Area of Circle: 50.265	Enter Choice: 2 Enter One Side: 4	Area of Square: 16	Enter Choice: 3 Enter Length: 4 Enter Width: 3	Area of Rectangle: 12	[Marks-6]	CLO-2 Level-3
Sample Input	Sample Output											
Enter Choice: 1 Enter Radius: 4	Area of Circle: 50.265											
Enter Choice: 2 Enter One Side: 4	Area of Square: 16											
Enter Choice: 3 Enter Length: 4 Enter Width: 3	Area of Rectangle: 12											
c)	<p>You’re helping a friend build a quirky mobile app called “Number Mirror” that shows how numbers would look if they were reflected in a magical mirror. As the backend developer, your task is to write a program that takes any positive integer as input and reverses its digits using only a loop. This reversed version is what the mirror would display. Construct a C program for the logic of the app.</p> <table border="1" data-bbox="330 1715 1123 1911"> <thead> <tr> <th data-bbox="330 1715 715 1760">Sample Input:</th><th data-bbox="715 1715 1123 1760">Sample Output:</th></tr> </thead> <tbody> <tr> <td data-bbox="330 1760 715 1911">Enter a number: 7081</td><td data-bbox="715 1760 1123 1911">Mirror image: 1807</td></tr> </tbody> </table>	Sample Input:	Sample Output:	Enter a number: 7081	Mirror image: 1807	[Marks-5]	CLO2 Level-3					
Sample Input:	Sample Output:											
Enter a number: 7081	Mirror image: 1807											



Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Midterm Examination, Summer 2025

Course Code: SE212; Course Title: Software Requirements Specification & Analysis

Sections & Teachers: MTM(A), RHH(B, K), FRR(C), RMS(D-G), KBB(H-I), NML(J), SHN(L)

Time: 1 Hour 30 Mins

Marks: 25

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.]

Dr. Sameera is a senior physician working at a multi-specialty hospital. The hospital recently adopted a digital Hospital Management System (HMS) to streamline its operations. One morning, she logs into the system using her secure credentials and views her daily appointments. The dashboard displays patient names, appointment times, symptoms, and assigned consultation rooms. She clicks on a patient profile, which opens the patient's medical history, lab reports, past prescriptions, and billing records. She adds notes, prescribes medicine, and schedules a follow-up. Meanwhile, the patient uses the mobile HMS app to receive updates on prescriptions, invoices, and future appointments. The pharmacy module processes the prescription and alerts the inventory manager to restock a low-supply medicine. Simultaneously, the lab technician receives a notification to perform a requested blood test. At the end of the day, the system generates analytics for the hospital administrator, showing patient flow, department efficiency, and billing summaries. The secure and integrated HMS enhances coordination among departments, reduces human error, and ensures fast service to patients while maintaining confidentiality and user-friendliness.

1.	a)	Analyze the given scenario and identify the functional and non-functional requirements for the system, explaining how they support its intended functionalities and user experience.	[Marks-4]	CLO-1 Level-2
	b)	Describe the user profile of Dr. Sameera and illustrate her smooth interaction with the HMS.	[Marks-3]	
	c)	Read the following scenario and identify the relevant feasibility types involved. Then, explain how each selected feasibility study helps assess the success of the proposed ^{HMS} airforce security maintenance software.	[Marks-4]	
2.	a)	Rocket, a popular mobile financial service, is planning to redesign its transaction system to offer faster money transfers, biometric login, real-time fraud detection, and improved user experience for rural and urban users. The development team aims to collect detailed requirements from a wide range of users including agents, daily wage earners, and small shop owners. Since most users have limited technical knowledge, the company wants to ensure that their pain points and suggestions are clearly understood. The system must also ensure compatibility with low-end devices and unstable internet connections. User feedback will shape features such as transaction limit settings, language preferences, and offline notification support. <i>Explain appropriate elicitation techniques for the Rocket transaction</i>	[Marks-6]	CLO-2 Level-2

		<i>system described in the scenario and justify your choice with a detailed explanation of how it will effectively gather the necessary requirements.</i>		
	b)	<i>Discuss the drawbacks of alternative elicitation techniques that you decided not to use during the requirement collection phase and explain why they were less suitable for the Rocket transaction system scenario.</i>	[Marks-3]	
3.	a)	<p>Rahim, a small shop owner in a rural town, relies heavily on Rocket, a mobile financial service, to receive payments from customers and send money to his suppliers. Recently, Rocket announced that they are redesigning their transaction system to make services faster and more user-friendly for people like Rahim. The new system will allow users to log in using biometric authentication or a secure PIN, perform instant money transfers, check balances, and download transaction reports. To ensure transparency and safety, Rocket has integrated a real-time fraud detection feature that alerts users instantly in case of any suspicious activity. Rahim is especially excited about setting a daily transaction limit and choosing his local language in the app, making it more personal and easy to use. The company has also committed to supporting low-end smartphones and ensuring that the app works even in areas with poor internet connectivity. Meanwhile, Rocket agents continue assisting users with cash-in and cash-out services, and system admins monitor user activity and system health. Rahim feels confident that these improvements will make his business transactions more secure, reliable, and convenient.</p> <p><i>Draw a use case diagram for the Rocket transaction system. Include key actors like users, agents, and admins.</i></p>	[Marks-5]	CLO-3 Level-3