



Daffodil International University
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall-2023
Course Code: CSE123, Course Title: Data Structures
Level:1 Term:2 Batch: 64

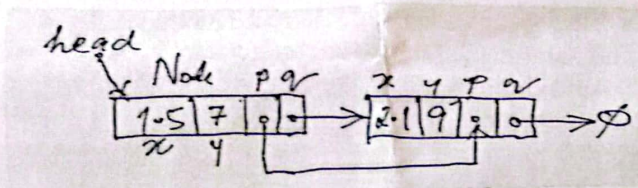
Time: 1 Hour and 30 Minutes

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.]*

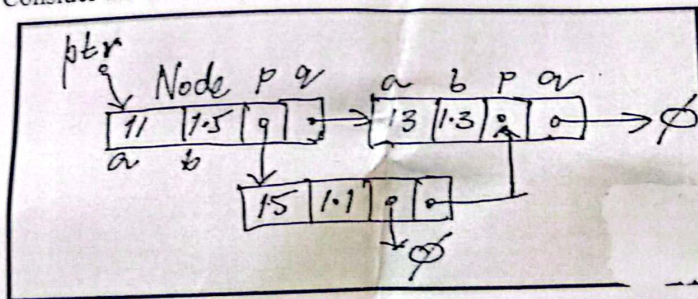
1. Consider the following figure:



Answer the following questions:

- (A) Define the Node shown above using C programming. 2 CO2
- (B) Write the necessary code to implement the above connection layout with initialization of data member. 4 CO2
- (C) Why pointer is essential for creating link. 2 CO1

2. Consider the following figure:



Answer the following questions:

- (A) Write necessary code to define the Node and implement the connection shown using C programming. 4 CO2
- (B) Why dynamic memory allocation requires pointer. 2 CO1

3. a) Convert the following infix expression to postfix and then evaluate the value of the expression using Stack:

- (I) $8/2+3-2*3+3$ 2
- (II) $2^2-4/2+2$ 2

CO1

b) Evaluate the following prefix expression and calculate the value:

- (I) // // // 3 2 8 2 2 1
- (II) $^3 3 * 2 - 3$

1
1

4.

Suppose a *CocaCola* factory is packing Coke bottles in box using automation process. In this automation process, Coke bottles are placed inside box and once the count reaches to 30, then the box moves through the conveyer belt and another box get to the Coke filling. In this entire automation process, the following observations are made:

- (A) Box once filled with Coke bottles get to the conveyer belt
- (B) Filled box moves towards package end
- (C) Another box gets filled

Answer the following questions:

- (A) Propose a data structure usage scenario based on Queue and Stack for the simulation of the above requirements. You may draw diagram to justify your answer.
- (B) Write the challenges to implement such solutions.

4

CO2

1

CO1

— Good Luck —



Daffodil International University
 Department of Computer Science and Engineering
 Faculty of Science & Information Technology
 Midterm Examination, Fall-2023
 Course Code: PHY-102, Course Title: Physics-II: Basic Electricity and
 Magnetism and Modern Physics
 Level: 01 Term: 02 Batch: 64

Time: 1 Hour and 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.	(a)	Can you recall Coulomb's law?	1	CO-1
	(b)	What is electric potential?	1	
	(c)	What do you mean by self-inductance and mutual inductance?	1	
	(d)	Tell something about current density.	1	
	(e)	Define magnetic flux.	1	
2.	(a)	Explain Ohm's law. What will be the electric flux for a cylindrical surface immersed in a uniform electric field? The field being parallel to the cylindrical axis.	4	CO-2
	(b)	Can you list the equation of current flowing through the shunt and the galvanometer?	3	
	(c)	Discover the magnetic induction at a point due to a long straight wire carrying current.	3	
3.	(a)	What way would you plan to solve the work-done in taking an electron from one point to another point when a charge of $20 \mu\text{C}$ produces an electric field? Two points are at distances 10 cm and 5 cm from the charge?	4	CO-3
	(b)	How would you solve that the equivalent capacitance of 4 capacitors of equal values when connected in series is $\frac{1}{16}$ times the equivalent capacitance when connected in parallel?	3	
	(c)	Select a way to find out the amount of flow of current in a circular coil which have a diameter of $31.4 \times 10^{-2} \text{m}$ and number of turn's is 400. And the magnetic field at the center of the coil will be $4 \times 10^{-10} \text{wbm}^{-2}$?	3	



Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall-2023

Course Code: MAT 102, Course Title: Mathematics II

Level: 01 Term: 02 Batch: 64

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. a) By using techniques involving the Gamma function estimate the exact value of [3] CO1

$$\int_0^{\infty} x^6 e^{-4x^2} dx.$$

Give the answer in the form $k\sqrt{\pi}$, where k is a constant.

- b) Illustrate β - Γ function to calculate [3]

$$\int_0^1 x^{\frac{3}{2}} (1-\sqrt{x})^5 dx.$$

- c) Determine the value of $\int_0^{\pi/2} 8 \tan^{\frac{1}{2}} \theta d\theta$. [3]

[In all cases, answers must be in fractions, not decimals]

2. a) If $u(x, y) = 1 + e^{xy}$ then find u_{xx} and u_{yx} . [2] CO3

- b) Apply Euler's theorem for the function $u = \cos^{-1} \left(\frac{x^5 + y^5}{x+y} \right)$ to show that [4]

$$4 \cot u = -x \frac{\partial u}{\partial x} - y \frac{\partial u}{\partial y}.$$

3. Mr. Karim covers a region R where $R = \{(x, y) | 0 \leq x \leq 2, -\sqrt{x} \leq y \leq 2\sqrt{x}\}$ [4] CO4
and $f(x, y) = xy$. Examine the volume of that region.

4. Construct the matrix form of $z_1 + z_2/z_3$, where $z_1 = (-3 - 5i)^5$, $z_2 = (7.5, 77^\circ)$ [6] CO2
and $z_3 = (12.7, 153^\circ)$.



Daffodil International University
 Department of Computer Science and Engineering
 Faculty of Science and Information Technology
 Midterm Examination, Fall 2023
 Course Code: ENG 102, Course Title: Writing & Comprehension
 Level: 1; Term: 2; Batch: 64

Time: 1 Hour and 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.]

Question 1 (Reading)	15 marks	CO1
<p>Reading Passage 1: Read the following passage and answer questions following.</p> <p style="text-align: center;"><i>The fact that people go to the Louvre museum in Paris to see the original painting Mona Lisa when they can see a reproduction anywhere leads us to question some assumptions about the role of museums of fine art in today's world</i></p> <p>One of the most famous works of art in the world is Leonardo da Vinci's Mona Lisa. Nearly everyone who goes to see the original will already be familiar with it from reproductions, but they accept that fine art is more rewardingly viewed in its original form.</p> <p>However, if Mona Lisa was a famous novel, few people would bother to go to a museum to read the writer's actual <u>manuscript</u> rather than a printed reproduction. This might be explained by the fact that the novel has evolved precisely because of <u>technological developments</u> that made it possible to print out <u>huge numbers of texts</u>, whereas oil paintings have always been produced as <u>unique objects</u>. In addition, it could be argued that the practice of interpreting or 'reading' each <u>medium</u> follows different conventions. With novels, the reader attends mainly to the <u>meaning of words</u> rather than the way they are printed on the page, whereas the 'reader' of a painting must attend just as closely to the material form of marks and shapes in the picture as to any ideas they may signify.</p> <p>Yet it has always been possible to make very accurate facsimiles of pretty well any fine art work. The seven surviving versions of Mona Lisa <u>bear witness</u> to the fact that in the 16th century, artists <u>seemed perfectly content to assign the reproduction of their creations to their workshop apprentices as regular 'bread and butter' work</u>. And today the task of <u>reproducing pictures is incomparably more simple and reliable</u>, with reprographic techniques that allow the <u>production of high-quality prints made exactly to the original scale, with faithful colour values, and even with duplication of the surface relief of the painting</u>.</p> <p>But despite an implicit recognition that the spread of good reproductions can be culturally valuable, museums continue to promote the special status of original work.</p> <p>Unfortunately, this seems to place severe limitations on the kind of experience offered to visitors.</p> <p>One limitation is related to the way the museum presents its exhibits. As repositories of unique historical objects, art museums are often called 'treasure houses'. We are reminded of this even before we view a collection by the presence of security guards, attendants, ropes and display cases to keep us away from the exhibits. In many cases, the architectural style of the building further reinforces that notion. In addition, a major collection like that of London's National Gallery is housed in numerous rooms, each with dozens of works, any one of which is likely to be worth more than all the average visitor possesses. In a society</p>		

that judges the personal status of the individual so much by their material worth, it is therefore difficult not to be impressed by one's own relative 'worthlessness' in such an environment.

Furthermore, consideration of the 'value' of the original work in its treasure house setting impresses upon the viewer that, since these works were originally produced, they have been assigned a huge monetary value by some person or institution more powerful than themselves. Evidently, nothing the viewer thinks about the work is going to alter that value, and so today's viewer is deterred from trying to extend that spontaneous, immediate, self-reliant kind of reading which would originally have met the work.

The visitor may then be struck by the strangeness of seeing such diverse paintings, drawings and sculptures brought together in an environment for which they were not originally created. This 'displacement effect' is further heightened by the sheer volume of exhibits. In the case of a major collection, there are probably more works on display than we could realistically view in weeks or even months.

This is particularly distressing because time seems to be a vital factor in the appreciation of all art forms. A fundamental difference between paintings and other art forms is that there is no prescribed time over which a painting is viewed. By contrast, the audience encourage an opera or a play over a specific time, which is the duration of the performance. Similarly novels and poems are read in a prescribed temporal sequence, whereas a picture has no clear place at which to start viewing, or at which to finish. Thus art works themselves encourage us to view them superficially, without appreciating the richness of detail and labour that is involved.

Consequently, the dominant critical approach becomes that of the art historian, a specialised academic approach devoted to 'discovering the meaning' of art within the cultural context of its time. This is in perfect harmony with the museum's function, since the approach is dedicated to seeking out and conserving 'authentic', original, readings of the exhibits. Again, this seems to put paid to that spontaneous, participatory criticism which can be found in abundance in criticism of classic works of literature, but is absent from most art history.

The displays of art museums serve as a warning of what critical practices can emerge when spontaneous criticism is suppressed. The museum public, like any other audience, experience art more rewardingly when given the confidence to express their views. If appropriate works of fine art could be rendered permanently accessible to the public by means of high-fidelity reproductions, as literature and music already are, the public may feel somewhat less in awe of them. Unfortunately, that may be too much to ask from those who seek to maintain and control the art establishment.

A. Complete the summary using the list of words, A-L, below. Write the correct letter, a-l, in boxes i-v on your answer sheet. The value attached to original works of art

People go to art museums because they accept the value of seeing an original work of art. But they do not go to museums to read original manuscripts of novels, perhaps because the availability of novels has depended on i. _____ for so long, and also because with novels, the ii. _____ are the most important thing. However, in historical times artists such as Leonardo were happy to instruct iii. _____ to produce copies of their work and these days new methods of reproduction allow excellent replication of surface relief features as well as colour and iv. _____. It is regrettable that museums still promote the superiority of original works of art, since this may not be in the interests of the v. _____

List of Words:

- | | | |
|----------------|---------------------|-------------------------|
| a. Institution | b. Mass Production | c. Mechanical Processes |
| d. Public | e. Paints | f. Artist |
| g. Size | h. Underlying Ideas | i. Basic Technology |
| j. Readers | k. Picture Frames | l. Assistants |

B. Do the following statements agree with the information given in Reading Passage?
Label

YES – if the statement agrees with the views of the writer
NO – if the statement contradicts the views of the writer
Not Given – if it is impossible to say what the writer thinks about this

- i. Art history should focus on discovering the meaning of art using a range of media.
- ii. The approach of art historians conflicts with that of art museums.
- iii. People should be encouraged to give their opinions openly on works of art.
- iv. Reproductions of fine art should only be sold to the public if they are of high quality.
- v. In the future, those with power are likely to encourage more people to enjoy art.

Reading Passage 2: Read the following passage and answer questions that follows.

- a.** Artificial intelligence (AI) can already predict the future. Police forces are using it to map when and where crime is likely to occur. Doctors can use it to predict when a patient is most likely to have a heart attack or stroke. Researchers are even trying to give AI imagination so it can plan for unexpected consequences. Many decisions in our lives require a good forecast, and AI is almost always better at forecasting than we are. Yet for all these technological advances, we still seem to deeply lack confidence in AI predictions. Recent cases show that people don't like relying on AI and prefer to trust human experts, even if these experts are wrong. If we want AI to really benefit people, we need to find a way to get people to trust it. To do that, we need to understand why people are so reluctant to trust AI in the first place.
- b.** Take the case of Watson for Oncology, one of technology giant IBM's supercomputer programs. Their attempt to promote this program to cancer doctors was a PR disaster. The AI promised to deliver top-quality recommendations on the treatment of 12 cancers that accounted for 80% of the world's cases. But when doctors first interacted with Watson, they found themselves in a rather difficult situation. On the one hand, if Watson provided guidance about a treatment that coincided with their own opinions, physicians did not see much point in Watson's recommendations. The supercomputer was simply telling them what they already knew, and these recommendations did not change the actual treatment. On the other hand, if Watson generated a recommendation that contradicted the experts' opinion, doctors would typically conclude that Watson wasn't competent. And the machine wouldn't be able to explain why its treatment was plausible because its machine-learning algorithms were simply too complex to be fully understood by humans. Consequently, this has caused even more suspicion and disbelief, leading many doctors to ignore the seemingly outlandish AI recommendations and stick to their own expertise.
- c.** This is just one example of people's lack of confidence in AI and their reluctance to accept what AI has to offer. Trust in other people is often based on our understanding of how others think and having experience of their reliability. This helps create a psychological feeling of safety. AI, on the other hand, is still fairly new and unfamiliar to most people. Even if it can be technically explained (and that's not always the case), AI's decision-making process is usually too difficult for most people to comprehend. And interacting with something we don't

understand can cause anxiety and give us a sense that we're losing control. Many people are also simply not familiar with many instances of AI actually working, because it often happens in the background. Instead, they are acutely aware of instances where AI goes wrong. Embarrassing AI failures receive a disproportionate amount of media attention, emphasising the message that we cannot rely on technology. Machine learning is not foolproof, in part because the humans who design it aren't.

d. Feelings about AI run deep. In a recent experiment, people from a range of backgrounds were given various sci-fi films about AI to watch and then asked questions about automation in everyday life. It was found that, regardless of whether the film they watched depicted AI in a positive or negative light, simply watching a cinematic vision of our technological future polarised the participants' attitudes. Optimists became more extreme in their enthusiasm for AI and sceptics became even more guarded. This suggests people use relevant evidence about AI in a biased manner to support their existing attitudes, a deep-rooted human tendency known as "confirmation bias". As AI is represented more and more in media and entertainment, it could lead to a society split between those who benefit from AI and those who reject it. More pertinently, refusing to accept the advantages offered by AI could place a large group of people at a serious disadvantage.

e. Fortunately, we already have some ideas about how to improve trust in AI. Simply having previous experience with AI can significantly improve people's opinions about the technology, as was found in the study mentioned above. Evidence also suggests the more you use other technologies such as the internet, the more you trust them. Another solution may be to reveal more about the algorithms which AI uses and the purposes they serve. Several high-profile social media companies and online marketplaces already release transparency reports about government requests and surveillance disclosures. A similar practice for AI could help people have a better understanding of the way algorithmic decisions are made.

C. The Reading Passage has six sections, a-f. Choose the correct heading for each section from the list of headings below.

Write the correct number, i-viii, beside 1-5 on your answer sheet.

List of Headings

- i An increasing divergence of attitudes towards AI
- ii Reasons why we have more faith in human judgement than in AI
- iii The superiority of AI projections over those made by humans
- iv The process by which AI can help us make good decisions
- v The advantages of involving users in AI processes
- vi Widespread distrust of an AI innovation
- vii Encouraging openness about how AI functions
- viii A surprisingly successful AI application

- 1. Section a
- 2. Section b
- 3. Section c
- 4. Section d
- 5. Section e

Question 2 (Grammar)		6 x 0.5 = 3 marks	CO 2
A.	<p>Read the underlined sentences and identify if these sentences are Simple, Complex, Compound or Complex-compound according to their structure:</p> <p>The amount of waste produced on our planet daily is unfathomable. New York City alone disposes of 12,000 tonnes of household trash every single day. (i) <u>Considering the amount humans throw away, first-world countries generally have efficient and effective waste removal, but it's not perfect.</u> (ii) <u>Tonnes of waste end up in the environment every year, polluting our land and water.</u> (iii) <u>Debris from construction, storms, and windy recycling days is scattered around accidentally with illegal dumping adding to the mess.</u></p> <p>Keeping waste out of the environment is essential for many reasons. For one, our health relies on it. Many of us obtain our drinking water from local freshwater sources that are increasingly being polluted. (iv) <u>It is now well known that microplastics are contaminating our soil, air, and water and we are just beginning to understand the consequences of that.</u> Our economy is also impacted by waste, not only because litter in the environment is ugly and not good for tourism, but also because taxpayers pay billions of dollars annually for waste cleanup and disposal. (v) <u>We also have to think about the wildlife that gets trapped in debris or ingests it.</u></p> <p>The good news is that there are people around the world trying to solve this problem. (vi) <u>In the last decade, there has been a lot of innovation in environmental cleanup, and the technologies keep getting better.</u></p>		
Question 3 (Writing)		1 x 7 = 7 marks	CO 3
A.	<p>Compose a letter on the following topic: Write no less than 150 words.</p> <p>You have been offered a place at a prestigious university in USA, but the cost of tuition, textbooks, and living expenses are beyond your family's financial capacity, and you are seeking a student loan to pursue your post-graduation abroad.</p>		

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Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall-2023

Course Code: CSE121, Course Title: Electrical Circuits

Level:1 Term:2 Batch:64

Time: 1 Hour and 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.	a)	Interpret the R.M.S Value considering regular sinusoidal current?	[1]	CO1
	b)	Explain under what condition the maximum power will be transferred?	[1]	
	c)	Compare the value of resistance when the circuit is open or short?	[1]	
	d)	Illustrate AC and DC current in a time domain?	[1]	
	e)	Show the process to convert Norton equivalent circuit into Thevenin equivalent circuit?	[1]	
2.	a)	Apply the superposition principle to find out the current through the 2.2 kΩ resistor for the network in Figure-1 below:	[5]	CO2
	b)	Select appropriate method in Figure-2 below: i. Solve the value of R for maximum power transfer. ii. Identify the maximum power of R.	[5]	

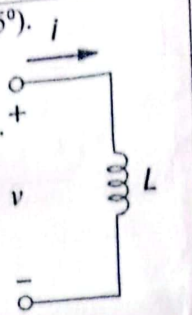
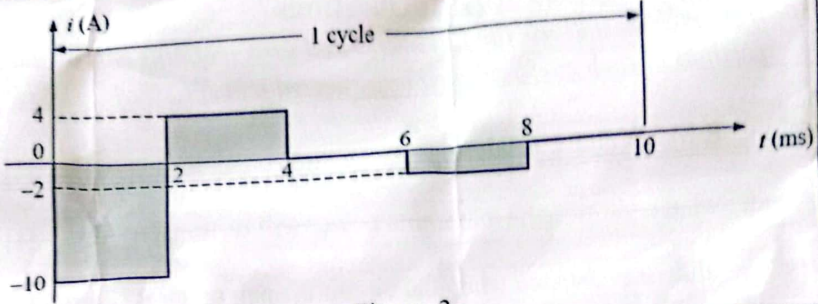
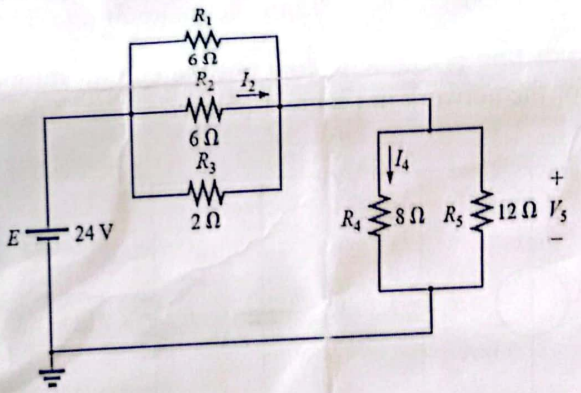
3.	<p>a) The current through a 0.3 H coil is $i = 8.5 \sin(500t - 65^\circ)$.</p> <p>Now solve the sinusoidal expression for:</p> <ol style="list-style-type: none"> Sinusoidal expression for the voltage across the coil. Plot V vs I curve RMS value of the given current i 		[5] CO2
b)	<p>Apply relevant method to determine the average value of the waveform shown in Figure-3 below:</p>		[2.5]
c)	<p>Solve the circuit below in Figure-4 to determine I_2, I_4 and P_5 (power through R_5 resistor)</p>		[2.5]

Figure-4