Daffodil International University

Department of Computer Science and Engineering

Faculty of Science & Information Technology

Final Examination, Fall-2023

Course Code: CSE115, Course Title: Introduction to Biology and Chemistry for Computation

Level:1 Term: 1 Batch: All

Time: 2 Hours **Marks: 40**

Answer ALL Questions [Optional]

[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)	You are a young and passionate physicist working in a world-renowned research institute, where you have access to cutting-edge equipment and collaborate with brilliant minds in your field. In your research, you are investigating a groundbreaking and elusive phenomenon in the realm of Computational Chemistry. If you could design a novel computational chemistry method that doesn't exist yet, what would it be, and how would it revolutionize our understanding of molecular interactions and chemical reactions? **Explain** its theoretical underpinnings and potential applications. **Differentiate** its significance and characteristics from other methods like DFT, Hartree-Fock or semi-empirical methods?	[7]	CO2
	b)	***Explain*** *Energy Minimization.* ***Describe*** *Energy Minimization with respect to Molecular mechanics.*	[3]	
2.		*You are a bioinformatics researcher working on a project that involves comparing the DNA sequences of two closely related species of butterflies to study their evolutionary relationships. The goal of your project is to identify similarities and differences in the DNA sequences, which will help you understand the genetic basis of their unique color pattern. For this purpose,* **apply** *the* **Needleman-Wunsch** *algorithm for the following sequences.* **Determine** *the alignment with the highest score and provide the resulting alignment.* First Species: **AGCGAAT** Second Species: **AGCTAA** *Match Score: (last digit of your id)%3* *Mismatch Score: -1* *Gap Penalty: -2*	[7]	CO3
3.		The BWT is a data transformation algorithm that restructures data in such a way that the transformed message is more compressible.The idea of this method is to build an array whose rows are all cyclic shifts of the input string in dictionary order and return the last column of the array that tends to have long runs of identical characters.		CO3

A sequence is given below-
ATTGAA

a)	***Construct*** a Borrower Wheeler Matrix (BWM) for the given sequence.	[5]	
b)	***Apply*** *LF mapping on the Borrower Wheeler Matrix (BWM) found at solution of question 3(a)*	[5]	
c)	***Determine*** the significance of the '$' sign embedded in the text in BWT?	[3]	

4.	You are a bioinformatician working on a research project in a genomics laboratory. Your project involves the identification of specific genes responsible for a rare inherited disorder. To achieve this, you have a dataset containing a vast number of DNA sequences obtained from individuals affected by the disorder and a set of reference genomes. You decide to apply an algorithm which will compare the sequences and find similarities and dissimilarities among them. Two of the sequences are given below Query Sequence: ATCCTCGCGCCTCATCTA Target Sequence: TTCGCGCAGCGTAGAGGGT		**CO3**
a)	**Identify** the appropriate algorithm and **apply** it on the given sequences.	**[10]**	

Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Final Examination, Fall-2023
Course Code: MAT101, Course Title: Mathematics I
Level: 1 Term: 1 Batch: 65

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.]

1.	a)	Find the partial fractions of the following rational fraction $\frac{2x-3}{(x+4)(x^2+7)}$	6	CO2
	b)	Find the partial fractions of the following improper fraction $\frac{2x^3-3x-7}{x^2+4x-5}$	4	
2.	a)	Identify the maximum and the minimum value of the function $f(x) = 2x^3 - 15x^2 + 36x + 10$	6	CO3
	b)	Solve the derivative $\frac{d}{dx}\left(\sin^{-1}\left(e^{\cot^{-1}x}\right)\right)$	4	
3.	a)	Solve the following integrals (i) $\int x^2 \sin 3x\, dx$ (ii) $\int \frac{e^x(1+x)}{\cos^2(xe^x)}dx$ (iii) $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\cot x}$	5 4 4	CO4
	b)	Identify the area of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ by using integration. Then deduce the area if $a^2 = 25$ and $b^2 = 4$.	7	

Daffodil International University

Department of Computer Science and Engineering
Faculty of Science & Information Technology
Final Examination, Fall-2023
Course Code: PHY101, Course Title: Physics-I
Level: 1 Term: 1 Batch: 65
Time: 2:00 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.	a)	What is the basic difference between heat and temperature?	[Marks] [1x10=10]	CO-1
	b)	What is refractive index?		
	c)	What is the relation between phase difference and path difference?		
	d)	State 1st law of thermodynamics .		
	e)	What is diffraction of light?		
	f)	What is reflection of light?		
	g)	What is destructive interference of light?		
	h)	What are the types of thermodynamic process?		
	i)	What is entropy?		
	j)	What is root mean square velocity of gas molecule?		
2.	a)	Briefly explain the signal pass through of an optical fiber.	[Marks] [4x3+3=15]	CO-2
	b)	Explain Young's double slit experiment.		
	c)	Explain that the entropy change of a perfect reversible engine is zero.		
	d)	Show that the ratio of specific heat (C_p/C_v) is 1.4 for diatomic gas molecules.		
3.	a)	The refractive index of core glass is 1.53 and cladding glass is 1.48 of a fiber optic cable. Find the minimum angle of incident light for total internal reflection	[Marks] [3x5=15]	CO-3
	b)	A ray of light travels from water into a glass at an angle of incidence of 30 degrees. If the refractive index of the glass and water are 1.52 and 1.33, respectively. Determine the angle of refraction.		
	c)	Determine the temperature at Fahrenheit scales which has 45^0 in at Celsius scale.		
	d)	Let a gas enclosed in a cylinder with piston. By keeping the pressure fixed at 400 Pa, if 1200 J heat is supplied to the system it does 700 J work. Determine the change in internal energy of the system.		
	e)	A Carnot's engine is operated between two reservoirs at temperature of the source is 520K and 400K. If the engine receives 1000 calories of heat in each cycle, calculate the heat reject in each cycle. (1 cal= 4.18 J)		

Daffodil International University

Department of Computer Science and Engineering
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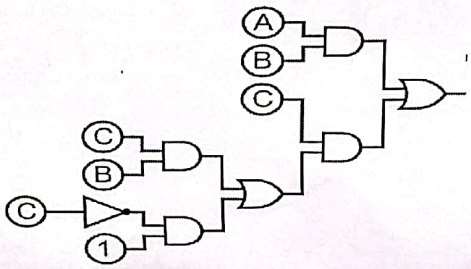
Final Examination, Fall 2023
Course Code: CSE112, Course Title: Computer Fundamentals
Level 1 Term 1 **Batch: 65**

Time: 2:00 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)	The manufacturer has designed a logic circuit that is not cost-effective. To address this issue, we will derive the Boolean function represented by the circuit and then minimize the redundancy to simplify and to make it cost-effective. 	[6]	CO3
	b)	Using Boolean identities, reduce the given Boolean expression: $F(X, Y, Z) = X.Y + Y.Z + Y.Z + X.Y.Z$ Now, explain the comparison between the simplified and original expression.	[4]	
2.	a)	As a network engineer assigned to address a communication problem between two devices on a network, how would you leverage the OSI model to articulate the operational processes at both the sender and receiver ends?	[4]	CO1
	b)	What are the key advantages associated with Distributed Computing Systems, and how do these benefits contribute to the efficiency and performance of large-scale computing environments?	[4]	
	c)	How do process management mechanisms contribute to the efficient operation of computer systems?	[2]	
3.	a)	Suppose, you have been tasked with creating a basic calculator program capable of performing addition, subtraction, multiplication, and division based on user choice. Now design a clear and concise pseudo code and flowchart that represents how the program will work, including decision points and symbols for clarity and ease of use.	[6]	CO4
	b)	Imagine you are teaching a programming class to your juniors. How would you explain the concept of functions and variables, and how can they differentiate null and void?	[4]	
4.	a)	In Bangladesh, a high school student becomes a victim of a cyberbullying attack through social media platforms, experiencing harassment and threats online. The incident is causing emotional distress and affecting the student's well-being. Given the scenario of a cyberbullying attack in Bangladesh, discuss the provisions of the Digital Security Act and how it addresses cyberbullying crimes. What legal actions can the victim take, and how does the Digital Security Act contribute to the prevention and prosecution of cyberbullying offenses in the country?	[6]	CO1

b)	Consider yourself a software developer who has recently created a new mobile application and designed a distinctive logo for its branding. i. Specify the type of Intellectual Property (IP) protection relevant to both the mobile application and the logo. ii. Explain the importance of fair use practices for developers and users in the mobile application ecosystem.	[4

3. Complete the following sentences using zero, 1st, 2nd & 3rd conditional structures.	*10x1=10 Marks*	CO1

a) If I had time, ...
b) If I were the Prime Minister of Bangladesh, ...
c) If they had gone for a walk, ...
d) If she comes to see us, ...
e) I would have told you if .....
f) Would you mind if.....?
g) ....., I wouldn't have said no.
h) My friend will meet me at the station if he ..... (get) the afternoon off.
i) If I didn't do it, ...
j) If my father doesn't pick me up, I..... (take) the bus home.

4. Identify the correct part of speech of the following underlined words.	*1x6=6* Marks	CO1

a) *Mom asked me to go to the store* near my school
b) *I did not go to school* yesterday as I was sick.
c) *The place we visited yesterday was* serene.
d) *My brother had only* one egg for breakfast.
e) *The painting made by the artist is* almost impeccable.
f) When she was lying in the park an insect bit her.

5. Find out the errors in subject verb agreement and correct the verb against the number they occur/write 'CORRECT' if the sentence has no error.	*1x4=4* Marks	CO1

a) My father or my brothers is coming with me to play a musical instrument. b) A number of students is going on the trip. c) Some of the books on the shelf is dusty. d) Eight dollars are the price of a movie these days. e) The committee members leads very different lives in private. f) Your mom or dad have to be here in an hour. g) The news of demonetization shocks the entire nation. h) The police have been looking for the culprits.

6. Write an Email on the following topic	*10* Marks	CO1

Draft an email inviting a resource person/facilitator/speaker to your university's upcoming seminar/conference. (Address the program's vision, organizing details, the individual's significance to it, date and location, the outcomes, and other matters.)

Daffodil International University

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Final Term Examination **Semester: Fall 2023**

Course Code: CSE 113 **Course Title: Programming & Problem Solving**

Level:1 Term:1 **Batch: 65**

Time: 2.0 hours **Full Marks: 40**

Answer all of the following Questions

Q1. Demonstrate Error Finding & Bug Fixing: **[6]** **CO2**

a) Mention how many errors you can find in the following code. Explain the errors as per your understanding with line no. and why you think it as an error. **3**

```
1.  #include<Stdio.h>
2.  struct employee
3.  {  int id,
4.     float salary;
5.  };
6.  int main( )
7.  {
8.    employee e1,e2;
9.    e1.id=2001;e1.salary=90,
10.   e2.id=2002;e2.salary=80;
11.   printf( "First employee  id : %d & salary: %d\n", e1.id,e1->salary);
12.   printf( "Second employee  id : %f & salary: %f\n", e2->id,e2.salary);
13.   return 20;
14. }
```

b) **Construct** the code without any errors. **3**

Q2. Construct the Output for the given codes below (write only the output segment in a box) : **[9]** **CO3**

a)

```
#include<stdio.h>
void hel(int x)
{
   while(x-- >= 0) {
      printf("N holo %d\n",x*x);
      x++;   }
   return;
}
int main()
{
   int n=10;
   hel(n);
   return 0;
}
```

b)

```
#include<stdio.h>
int main()
{
   int m=20,n=30;
   int *p,*q;
   p=&n,q=&m;
   *p *= m,*q *= n;
   printf("m=%d n=%d\n",*q,n);
   printf("p=%d q=%d\n",*p,m);
   return 0;
}
```

3 + 3 +

c)

```
#include<stdio.h>
int main()
{
   int ar[3][3]={{5,2,3},{2,1,3},{2,2,2}},i,j;
   for(i=0;i<3;i++)
   {
      for(j=i;j<3;j++)
      {
         printf("I=%d J=%d\n", ar[i][j]*i,ar[j][i]);
      }
   }
}
```

3

Q3. Analyze the problem scenarios given below to write a full program for each of the following | [25] | CO4

a) Recently Apple released the Iphone 15 Series. They launched three mobile phones of 15 series: Iphone 15, Iphone 15 pro & Iphone 15 pro max. But one of the saddest things about these phones is that Apple does not provide a charger with the mobile. The user has to buy a charger externally. Mr. Tamim Iqbal is the former captain of "Mayer Doa Cricket Team" is going to be the captain again after the world cup. In these circumstances he wants to buy a new Iphone from the 15 series as he is a fan of the Iphone. But he does not have enough money to buy an original charger with the mobile, as he did not get the salary of the previous month from the "Mayer Doa Cricket Board". So, he planned to buy a duplicate charger that was manufactured by china. There are three types of charger that China manufactured for the Iphone 15 series. You have to help Tamim Iqbal by finding the cheapest one from them. — 5

Input: There will be three integers that are the prices of the three chargers.

Output: Show the cheapest price of the charger.

Sample Input	Sample Output
2000 5000 1500	1500

b) To qualify Main Round of Take-Off Programming Contest you have to participate in the preliminary round. There are some criteria by which the students are selected from preliminary round to main round. You go through the rules and you find that it is complex to calculate. You don't want to do the complex calculation and you make a rule for yourself that by maintaining the rule you believe that you can qualify to the main round. The rule is you have to solve a minimum number of problems to qualify in the main round. — 5

Input: In the first line you have to take an integer number N, representing the number of problems in the contest. In the next line you have to input N integers that represent the problems' verdicts (here 1 means you got accepted on the problem and 0 means you got the wrong answer).
The last line there will be an integer X, that represents the minimum number of problems you have to solve to qualify for the main round.

Output: Show "**Yes, I Will qualify!**" if you have qualified for the main round, otherwise show "**I am sorry!**".

Sample Input	**Sample Output**
6 1 0 1 1 1 1 4	**Yes, I Will qualify!**
6 1 0 1 0 0 1 4	**I am sorry!**

Explanation: *In the first sample you have solved 5 problems and the number of problem counts to qualify in the main round was 4, so you qualified for the contest.*

c) So, Almost you have completed the Programming and Problem Solving Course. Advanced Congratulations if you will pass this course. You tried hard and practiced problems each day and performed very well. I am your course teacher in this course and I want to give you an opportunity to get an experience of Student prefect with me in the next semester. I want to give a prize to my section's students based on the weekly performances in the next semester to motivate the students. As you are the best programmer of the previous course, I am given the responsibility to find out the best weekly performance. You will be given the day wise problem solve count of a week of students of the class serially from roll 1, you have to find out the best one. — 5

GOOD LUCK

[25] CO4

Input: In the first line there will be an integer **N**, the number of students in the class. Then there will be N lines and each line will contain 7 integers that are the solve count of 7 days of the students.

Output: Show the student roll number, who have solved the most problems in the format "**Roll - X is performer of the week.**", where X is the roll number.

Sample Input	Sample Output
3 2 3 0 1 0 1 1 4 1 1 1 1 1 1 3 2 4 1 0 1 1	**Roll - 3 is performer of the week.**

Explanation:
Roll-1 student solve count = 8.
Roll-2 student solve count = 10.
Roll-3 student solve count = 12.

d) Recently you are learning C Programming language and your teacher taught you a new topic about String. String is the combination of multiple characters, digits or symbols. As your teacher taught you about string already so he gives you a task. He told you to pick a name and gave you two characters X, Y and told you from that name you have to replace all the X with Y. As you are a good programmer and doing good at programming, he expects you to solve this problem and satisfy him. 5

Input: In the first line there will be a string **S** (it will have no space and contains only uppercase and lowercase characters). In the next two lines there will be two characters **X** and **Y**.

Output: You have to print a new string from S replacing character X by character Y (For more clarification see the sample input output)

Sample Input	Sample Output
MehedyHasanMiraz a e	MehedyHesenMirez

Explanation: *In the Sample Input, you have to replace all the characters 'a' with 'e' in the string.*

e) From childhood you love digits. You love to play with digits. Recently you have learned about programming and are learning more and more new topics in programming languages. Today your teacher has teached you about recursion. Recursion is one of the most fascinating topics in programming because when you think about a problem and want to solve it with recursion you need to make your own imaginary visualization of how it can manipulate your code using a few lines of code. As you love digits and learn about recursion you want to solve a **Sum Of Digit** *problem using recursion. You have already solved this problem using loop but now as you learn about recursion you want to solve this problem using recursion. You don't need to do many things. All you have to do is You will be given a number* **N**. *You have to do a sum of all digits of this number N(using recursion) and show the result as output.* 5

Input: *You are given a number* **N**.

Output: *Print the sum of the digits of* **N**(using recursion)

Sample Input	Sample Output
54321	15