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

Exam Duration: 1.5 Hours   **Marks: 25**

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. Analyze the time complexity of the following code:		
	[2.5 + 2.5]	CO1

```
a)
for(i=0;i*i<=n;++i){
    sum=sum+i;
}

for(j=0;j<=n;++j){
    sum=sum+j;
}
```

```
b)
if(n%2==0){
    for(i=1; i<=n; ++i){
        for(j=1; j<=n; ++j){
            printf("Anything");
        }
    }
}
else{
    for(j=1; j<=n; ++j){
        printf("Anything");
    }
}
```

2. Apply a sorting algorithm that does not follow the divide and conquer method on the following data to sort them in increasing order and show step by step simulation. [15, 5, 49, 36, 27, 6, 1, 43, 29, 30]	[5]	CO2
3.	[5]	CO2

Character	H	E	L	O	A	P	_
Frequency	105	25	27	80	14	54	38

Given the above informative Table if someone wants to send a message "HELLO_APP" Applying Huffman coding techniques what will be the huffman encrypted message [i.e. Character wise encrypted Huffman code]. Show all the necessary steps.

CamScanner

4. Suppose you are looking for a book in a Library with code number 27. The library has many books and the books are sorted by code number on the bookshelf.

   Unfortunately you have entered the library at the back side of the library [i.e for the given example below your starting position is in front of Book number 64]. Now you have to find out the book with code 27 and you will be given some Book code numbers. Apply an appropriate algorithm to find out the book as early as possible and show all the necessary steps.

   [64 51 43 42 38 30 27 23 15 7]

   [5] CO3

5. Kakababu is a famous character in a Bangla short story. Basically he likes adventures and discovering historical and mysterious things.

   One day he and his nephew Shontu travel in the Arab country and they find a cave that contains some valuable stones. They were very delighted to collect the stones but unfortunately they had only a bag that can carry only 10kg.

   Shontu is your best friend and Shontu wants help from you to choose the stones that they can carry and make the best profit. Apply an appropriate algorithm to help Shontu.

   [5] CO3

Stones	Value	Available Unit
Diamond	5	3
Pearl	7	2
Ruby	8	5
Sapphire	3	4
Emerald	10	1

   [NB: They can partially take any stones and the stones are limited.]

$$22 + \left(\frac{4}{5} \times 8\right)$$
6.9

$$22 + \left(\frac{4}{5} \times 8\right) \quad (4kg)$$

1+2 6.4

22.4

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

Exam Duration: 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.	Apply laws of logical equivalences to prove that the following logical expression is always a tautology. $(\neg P \wedge \neg R) \vee (P \wedge \neg Q \wedge \neg R) \leftrightarrow \neg R \wedge (Q \rightarrow \neg (P \wedge \neg R))$	[5]	CO1
2.	Apply rules of inferences to prove whether the argument is valid or not. "Either Alex will present at the conference, or Blake will attend the workshop. If Blake attends the workshop, Casey will prepare the team report. If Alex presents at the conference, Dana will not join the post-conference networking event. Dana will join the post-conference networking event. If Casey prepares the team report, then Erin will handle the client follow-ups. Therefore, Erin will handle the client follow-ups"	[5]	CO1
3.	Translate the following statement using predicate, quantifiers and logical connectives when domain of discourse consist of all integer number. a) The cube of any odd integer is also odd. b) For any two integers, their sum is greater than either of the integers.	[5]	CO1
4.	Let p, q, and r be the propositions p: Lions have been seen in the area. q: Riding is safe on the trail. r: Goji Berries are ripe along the trail. Write these propositions using p, q and r and logical connectives (including negations). i) Lions have not been seen in the area and riding on the trail is safe, but Goji berries are ripe along the trail. ii) For riding on the trail to be safe, it is necessary but not sufficient that Goji berries not be ripe along the trail and for Lions not to have been seen in the area.	[5]	CO1
5. a)	Let f be the function from {a, b, c, d} to {1, 2, 3} defined by f (a) = 3, f (b) = 2, f (c) = 1, and f (d) = 3. Find out whether f is an injective or surjective function	[2]	
b)	In a music appreciation survey conducted within a class of 60 students, participants were asked about their preferences for three distinct music genres: Classical, Jazz, and Rock. The findings revealed that 35 students had a preference for Classical music, 40 students favored Jazz, and 30 students enjoyed Rock. It was also observed that there was an overlap in preferences: 15 students liked both Classical and Jazz, 18 students enjoyed both Jazz and Rock, and 20 students appreciated both Classical and Rock. It was noted that every student in the class had a liking for at least one of the three genres. The task is to determine the number of students who have a liking for all three genres: Classical, Jazz, and Rock, based on the provided data.	[3]	CO2

$\neg p \vee \neg (P \vee R) \vee (P \wedge \neg (Q \vee R)) \neg Q$

$\neg F \quad F \wedge R \quad P \wedge T = P$

Daffodil International University
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Department of Computer Science and Engineering
Midterm Examination, Spring-2024
Course Code: CSE215, Course Title: Electronic Devices and Circuits
Level: 2   Term: 1   Batch: 64

Time: 1 Hour and 30 Minutes   Marks: 25
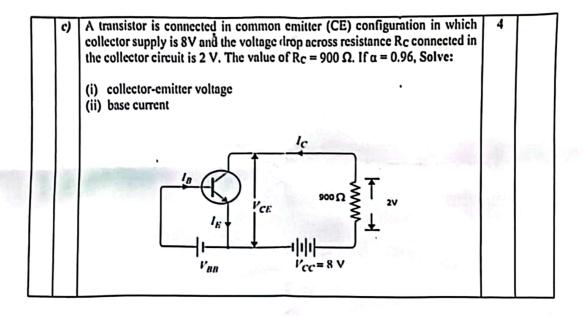
Answer ALL Questions
[The figures in the right margin indicate the full marks and corresponding course outcomes.
All portions of each question must be answered sequentially.]

1.	a)	Define ripple factor.	1	CO1
	b)	List the kind of dopants are used to make P type semiconductor.	1	
	c)	Recall the kind of semiconductor cannot produce useful current.	1	
	d)	Relate the relation between input frequency and output frequency of a full wave rectifier.	1	
	e)	Name the three possible transistor connections.	1	
2.	a)	Show that in half-wave rectification, a maximum of 40.6% of a.c. power is converted into d.c. power.	5	CO2
	b)	Interpret the energy band description of semiconductors.	3	
	c)	Explain α is always less than unity.	2	
3.	a)	A voltage stabilizer uses three Zener diodes, each rated at 16 V, which are connected in series. Series and load resistance are 2 KΩ and 6 KΩ respectively and the supply voltage is 72 V. R_L Solve the problem for (i) the output voltage (ii) the voltage drops across series resistance and (iii) the current through the Zener diode.	4	CO3
	b)	The collector leakage current in a transistor is 300 μA in CE arrangement. If now the transistor is connected in CB arrangement, identify what will be the leakage current? Given that β = 150.	2	

| c) | A transistor is connected in common emitter (CE) configuration in which collector supply is 8V and the voltage drop across resistance R_C connected in the collector circuit is 2 V. The value of $R_C = 900\ \Omega$. If $\alpha = 0.96$, Solve:

(i) collector-emitter voltage
(ii) base current | 4 | |

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

Exam Duration: 1.5 Hours   Marks: 25

Answer ALL Questions
[The figures in the right margin indicate the full marks and corresponding course outcomes.

1.	Suppose, happiness and peace are characters in a story.			
	a)	Explain the personalities of happiness and peace.	2	CO1 L2
	b)	Outline the adventures they would experience together.	3	
2.	Imagine you are a counselor at a university's student support center. A student named Moniruzzaman has come to you seeking guidance on how to overcome his insecurities about his English skills and accent.			
	Q	Explain specific counseling strategies that can be recommended to support Moniruzzaman in overcoming his challenges and fostering his self-esteem.	5	CO1 L2
3.	Rahul, a successful and busy professional, finds himself irritated when his mother repeatedly asks him about a squirrel outside their window. Despite his frustration, his mother remains patient and understanding. Reflecting on her gentle demeanor, Rahul's mind wanders to his childhood, where his mother lovingly answered his repetitive questions without complaint.			
	a)	Compare and analyze Rahul's initial reaction to his mother's repetitive questions about the squirrel with a broader societal trend of neglect towards elderly parents in modern lifestyles.	5	CO2 L4
	b)	List the actions that can be taken to involve our parents in our modern lifestyle.	3	
4.	Suppose you are an active user of social media platforms.			
	Q	Evaluate your approaches in managing situations involving harsh comments or negativity on social media platforms, reflecting on the effectiveness of your responses and the preservation of a positive online presence.	7	CO3 L5

Daffodil International University
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Mid Semester Examination, Spring-2024
Course Code: BNS101   Course Title: Bangladesh Studies
Level: 2   Term: 1

Exam Duration: 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.	Infer the primary demographic strengths and opportunities of Bangladesh with suitable examples.	5	CO1
2.	Compare the positive and negative influences of technological advancements in changing the socio-cultural landscape of Bangladesh.	5	CO1
3.	Analyze the core principles of Bangladesh's foreign policy as per your understanding.	5	CO2
4.	Summarize how the Bangla language evolved in three major periods and how it has been enriched by the incorporation of foreign words.	5	CO3
5.	Identify the essential attributes of a good constitution and examine them against the features of Bangladesh's constitution.	5	CO3

Daffodil International University

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

Time: 01:30 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)	Show an ODE for $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$.	[5]	CO1
b)	Show the solution of the homogeneous ODE $\dfrac{dy}{dx} = \dfrac{-x^2+xy+y^2}{xy}$.	[5]	
2.			
a)	Solve the ODE $\dfrac{dy}{dx} = \dfrac{6x-4y+1}{3x-2y+3}$ by using reducible to variable separable method.	[6]	CO2
b)	Solve the ODE $D^4y - 7D^2y - 18Dy = e^x$.	[6]	
3.			
a)	Identify y_p for $(D^2-4)y = x^3$	[3]	CO2