International Islamic University Chittagong

Center for General Education (CGED)

Midterm Examination: Autumn 2022 | **Program: Undergraduate**

Course Code: URIH-4701 | **Course Title: A Survey of Islamic History & Culture**

Time: 1 hours and 30 minutes. | **Full Marks: 30**

Instructions:

i. All Questions are Compulsory.

ii. Figures in the right margin indicate full marks.

iii. Course Learning Outcome (CLO) and Bloom's levels are mentioned in additional columns.

Bloom's Levels of the Questions.						
Letter of Symbol	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

		Text of the Questions	Marks	Bloom's Level	CLO
1		Explain the origin and development of the institution of *khilafah* in Islam. What are the qualities and responsibilities of a *khalifah*?	10	U	CLO1
2		Analyze the policy of Apostasy of *Khalifah* Abu Bakr (R). Why is he entitled as the savior of Islam? Or Analyze the administrative developments and reforms during the time of *Khalifah* Umar (R).	10	An	CLO3
3		Review the expansion of Islamic territories during the reign of *Khalifah* Umar (R). Or Analyze the importance of *Shura* and evaluate its development during the time of Prophet (SAAM) and rightly-guided four pious *Khalifah*.	10	An	CLO3

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International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Mid term Exam, Autumn 2022

Course Code: **CSE 3633** Course Title: **Computer Networks**

Time: 1 hour and 30 minutes Full Marks: 30

(i) The figures in the right-hand margin indicate full marks

(ii) Course Outcomes and Bloom's Levels are mentioned in additional Columns

Course Outcomes (COs) of the Questions	
CO1	**Understand** the architectures of different types of computer complex networks and protocols.
CO2	**Analyze** the architectures of different types of computer complex networks and protocols.
CO3	**Analyze** the performance of protocols and networks.
CO4	**Demonstrate** a familiarity with major network and security algorithms and protocols.

Bloom's Levels of the Questions						
DL	1	2	3	4	5	6
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

			Marks	CO	DL
1.	a)	Differentiate between TCP/IP and OSI model.	5	1	2
1	b)	Write down the names of corresponding layer in TCP/IP model for each of the following task: i. Detecting errors during the delivery of a message. ii. Representation of bits in a wire. iii. Delivery of a message to an appropriate process or application of the destination host. iv. Communication reliability is achieved. v. Address keeps on changing during communication over Internet?	5	1	2
2.	a)	Explain the hidden node problem and the exposed node problem with proper diagram for wireless communication.	5	4	4
2.	b)	How does CSMA-CD improve performance over CSMA protocols? Explain non persistent and persistent CSMA protocols.	5	4	4
		OR			
2	b)	In a multiple access network the average frame size is 200 bits and the channel capacity 200 kbps. Evaluate the throughput if the system generates 800 frames per second for the aloha system and for the slotted aloha system.	5	4	4
3.	a)	With proper examples, analyze the limitations of classful IP address hierarchy. Subnet a class A IP address into 4 subnets of equal size.	5	3	2
3	b)	Write down the comparison between IPv4 and IPv6.	5	3	2
		OR			
3	b)	Write short notes on the followings: 1. Network address, 2. Broadcast address, 3. Bridge, 4. MAC, 5. Netmask	5	3	2

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Midterm Examination, Autumn 2022

Course Code: CSE-4743 Course Title: Computer Security

Time: 1 hour and 30 minutes Full Marks: 30

The figures in the right-hand margin indicate full marks

Bloom's Levels of the Questions						
Letter Symbols	R	U	App	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

1. a)	Explain how passwords are stored nowadays. Give examples of tradeoffs between usability and security considering "Authentication".	CO1	An	5
b)	"Software and system security is all about managing risk"-Do you agree with this statement? Why?	CO2	E	5

Calculate Annualized Loss Expectancy (ALE) for each loss type. Consider the probability of small ATM fraud is five times higher than that of large ATM fraud.

Loss type	Amount	Incidence	ALE
SWIFT* fraud	Tk. 20,000,000	0.005	?
ATM fraud (large)	Tk. 250,000	0.10	?
ATM fraud (small)	Tk. 20,000		?
Teller theft	Tk. 3,240	300	?

2. a)	Explain the CIA triad with necessary examples. What is its significance?	CO1	U	5
b)	Write down an algorithm (i.e. pseudocode) to cryptanalyze a transposition cipher. You can consider a suitable ciphertext example if required.	CO2	An	5

OR

	Analyze and explain the strength of a one-time pad with any suitable key, plaintext, and ciphertext example.	CO2	An	5
3. a)	Describe how communication is secured using end-to-end encryption.	CO1	U	5

OR

	Explain congruence with an example. Show the additive and multiplicative inverses for modulo 7 arithmetic.			
b)	Briefly describe the logical and physical access control methods.	CO1	U	5

International Islamic University Chittagong

Department of Computer Science and Engineering

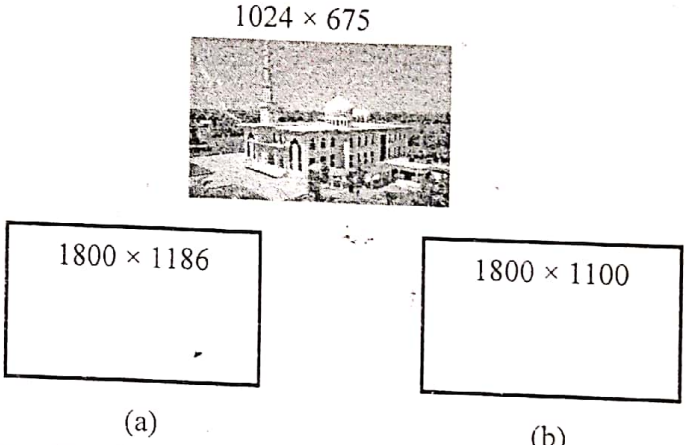
B. Sc. in CSE Midterm Examination, Autumn 2022

Course Code: CSE-4741 Course Title: Computer Graphics

Total marks: 30

*Time: **1 Hour and 30 minutes***

			CO	DL
1.	Differentiate image processing and computer graphics.			
a)	Or.	2	CO1	C2
	Differentiate Raster and Vector display.			
b)	You are asked to present the following image on two display devices whose sizes are given below.	4	CO1	C2



What kind of phenomena will be happened in each case? Explain with necessary computation.

c)	Write the working principles of a monochromatic display monitor CRT with proper diagram.	4	CO1	C1
2.	Compute the size of the image that would measure 1.6 inches by 1.2 inches at 240			
a)	pixels per inch	2	CO4	C3
b)	What steps are required to scan convert a line using Brasenham's algorithm.	3	CO3	C2
	Or			
	What steps are required to scan convert a line using DDA algorithm.			
c)	Suppose a circle has radius as 10 and centre of circle (100, 100). Indicate which raster location would be chosen while scan converting this circle using Bresenham's circle algorithm.	5	CO3	C3
3.	Write the procedure to fill polygon using flood fill algorithm.			
a)	Or	2	CO3	C1
	Explain the aliasing effect of scan conversion.			
b)	Compress the triangle with vertices A(0,0), B(1,1) and C(5,2) to half of its size while keeping B(1,1) fixed.	4	CO4	C3
	Or,			
	Find the transformation matrix that represents the rotation of a point (7,2) by 60° about the origin and about the point (3,3). What are the new coordinates after rotation?			
c)	Define geometric transformation. Explain 2D transformations with its basic types.	3	CO1	C1

Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

Mid Term Examination Autumn 2022

CSE 4745 Numerical Methods

Total Marks: *30* Time: *90* Minutes

[Answer ***all*** the ***three*** questions. Figures in the right-hand margin indicate full marks.]

1.a)	Draw the *block diagram* of the process of numerical computing.	2	CO1
b)	Write short notes on (any two): i) Roundoff errors ii) Truncation errors iii) Modeling Errors	2	CO1
c)	What do you mean by *significant digits?* Determine how many sinificant digits are there in the following numbers- **i) 905.607 ii) 0.00062 iii) 5.30×10^5 iv) 197.00 v) 2023**	3	CO2
d)	What do you mean by *absolute error* and *relative error*? If **X = 0.0610958** is rounded off to four significant figures compute the absolute error and relative error in X.	3	CO2
2.a)	What is *Horner's rule*? Evaluate the polynomial $\mathbf{f(x) = x^4 - 2x^3 + 5x^2 - 16x + 5}$ using Horner's rule at **x = M**. [M means the *last digit* of your ID number]	2	CO2
b)	Find the root of the equation $\mathbf{x^3 - 7x + 4 = 0}$, correct to two decimal places, by using the ***false position method***. [*False position formula:* $x_0 = x_1 - (f(x_1)(x_2 - x_1)) / (f(x_2) - f(x_1))$] ***OR*** Find the root of the equation $\mathbf{x^3 - 7x + 4 = 0}$, correct to two decimal places, by using the ***Newton – Raphson method***. [*Newton-Raphson formula:* $X_{n+1} = x_n - f(x_n) / f'(x_n)$]	5	CO2
c)	Describe an algorithm to determine *all possible roots* of an equation.	3	CO1
3.a)	Find the missing term in the following data using *Newton's Binomial Expansion formula*. **x 1 2 3 4 5** **y 7 – 13 21 37**	2	CO4
b)	Derive the *Newton's Backward interpolation formula*. ***OR*** Derive the *Newton's divided difference formula*.	4	CO3
c)	Using a *suitable interpolation formula*, determine the population of a town in **2017** [if the *last digit* of your ID is **odd**] / **2018** [if the *last digit* of your ID is **even**], with the help of the following data.	4	CO4

year	1961	1971	1981	1992	2002	2012	2022
population (in millions)	24	36	46	57	65	78	89

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE

Mid Exam, Spring 2022

Course Code: **CSE 4747** Course Title: **Mathematical analysis for Computer Science**

Time: 1 hours 30 minutes Full Marks: 30

(The figures in the right-hand margin indicate full marks

[Answer the questions from the followings]

1. a) Let T_n be the maximum number of comparisons used while Merge Sorting a list of n numbers. For now, assume that n is a power of 2. **04**

    1. Find the recurrence relation of the Merge Sorting to estimate T_n
    2. Solve the recurrence relation using Plug and Chug method.

    b) Let's consider a variation of the Towers of Hanoi problem. Suppose that moving a disk takes time proportional to its size. Specifically, moving the smallest disk takes 1 second, the next-smallest takes 2 seconds, and moving the nth disk then requires n seconds instead of 1. So, in this variation, the time to complete the job is given by a recurrence with a+ n term instead of a+1. The recurrence is given by the following constrains: **06**

    f(1)=1
    f(n)=2f(n-1)+n for n>=2

    Now, solve this recurrence relation with a cookbook solution.

2. a) Suppose we have a stack of books that will not tip over if the bottom book rests on the table—call that a stable stack. The overhang of a stable stack to be the horizontal distance from the center of mass of the stack to the furthest edge of the top book. So the overhang is purely a property of the stack, regardless of its placement on the table. If we place the center of mass of the stable stack at the edge of the table as in Figure 1, the overhang is how far we can get the top book in the stack to stick out past the edge. **05**

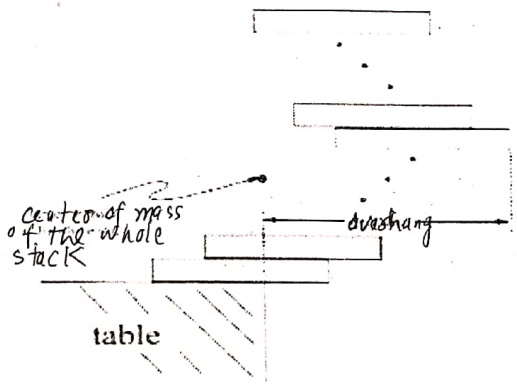


Figure 1. One book can overhang half a book length.

Now, formalizing this problem using sum. Then calculate maximum possible overhang by approximating the sum.

b) The factorial of n can be defined by the following product. Find a closed form of this product. 03

$$n! = \prod_{i=1}^{n} i$$

Or

Find an expression for the following series (summing the first n Harmonic numbers) that is as near as possible to a closed-form:

$$\sum_{k=1}^{n} H_k = \sum_{k=1}^{n} \sum_{j=1}^{k} \frac{1}{j}$$

c) A license plate consists of either: 02

1. 3 letters followed by 3 digits (standard plate)
2. 5 letters (vanity plate)
3. 2 characters—letters or numbers (big shot plate)

Let L be the set of all possible license plates. Compute L, the number of different license plates, using the sum and product rules, where L={A,B,…Z } and D={0,1,2,………,9).

3. a) You start with a kilogram of cement and a kilogram of sand in two separate bags. You put one-fourth of the cement from the first bag into the second, stir up the sand and cement mixture within the second bag before transferring one-fourth of this mixture to the first bag. You repeat this back-and-forth pouring and mixing process n times. Formulate an analytic model that captures this process and find a closed-form formula for the amount of cement in the first bag after n rounds of back-and-forth pouring. Also find the limiting amount of cement in each of the bags as n grows indefinitely. 06

Or

We are interested in generating functions for the number of different ways to compose a bag of n donuts subject to the following restrictions.

- All the donuts are chocolate and there are at least 3.
- All the donuts are glazed and there are at most 2.
- All the donuts are coconut and there are exactly 2 or there are none.
- All the donuts are plain and their number is a multiple of 4.

Now find a closed form for the number of ways to select n donuts subject to the above constraints.

b) You would like to give a bouquet for Mother's Day. You find an online service that will make bouquets of lilies, roses and tulips, subject to the following constraints: 04

- There must be at most 3 lilies
- There be any number of roses
- There must be a multiple of four tulips.

Now use generating function to determine how many ways can the online shop form a bouquet with n flowers.

// /////////////*the end* //