



International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
B. Sc. in CSE, Mid Term Examination (Special), Spring-2023
Course Code: MATH-2307, Course Title: Mathematics-III
Time: 1:30 hours Marks: 30
(Answer all questions. Figures in the right margin indicates full marks)
Section: 3AF

[N.B. Please answer the several parts of a question sequentially]

- | | | Marks | CLOs | DLs |
|-------|--|-------|------|-----|
| 1. a) | Define matrix. If $A = [a_{ij}]$ where $a_{ij} = \begin{cases} 0, & \text{when } i \neq j \\ 1, & \text{when } i = j \end{cases}$ then construct an 3×3 order matrix and Identify the type of matrix. Also test the matrix A is orthogonal or not. | 5 | CLO1 | C2 |
| b) | Define rank of a matrix and normal form of a matrix. Find the rank of the matrix, $A = \begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$ after reducing it to the normal form. | 5 | CLO1 | C2 |
| Or. | What is the name of the following linear system of equations? Solve it and identify the type of solution
$x + y - z = 0$, $2x + 4y - z = 0$ and $3x + 2y + 2z = 0$ | | | |
| 2. a) | Define Eigen values and Eigen vectors. Check whether the vector $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$ are eigen vector for $A = \begin{pmatrix} 1 & 2 \\ -4 & 7 \end{pmatrix}$. Showing your analysis procedure graphically (using of graph paper is not mandatory) | 5 | CLO2 | C2 |
| Or. | Using matrix method, solve the following equations,
$x + y + z = 6$, $x - y + z = 2$ and $2x + y - z = 1$ | | | |
| b) | State Cayley-Hamilton. Verify the Cayley-Hamilton theorem hence find A^{-1} for $A = \begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix}$ | 5 | CLO2 | C2 |
| 3. | Define diagonal matrix. Find the eigenvalues and the corresponding eigenvectors of $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$ and hence diagonalize the matrix. | 10 | CLO2 | C2 |

International Islamic University Chittagong

Center for General Education (CGED)

Midterm Examination, Spring-2023

Course Code: URED-2302 Course Title: Sciences of Qur'an and Hadith
(For Law faculty: URED-2101)

Full Marks: 30

Time: 1 hour & 30 minutes

Answer all questions. The right side columns contain marks, CLOs and Bloom's taxonomy domain for each question.

#	Questions	Marks	CLOs	Bloom's taxonomy domain
1	a) Define Al-Qur'an literally and terminologically. Explain some amazing features of the holy Qur'an elaborately. Or, b) "The holy Qur'an is the first and the main source of Islamic <i>Shari'ah</i> "- Justify this statement properly.	10	1	Remember & Create
2	"The holy Qur'an was revealed through stages"- evaluate this statement explaining the reasons.	10	2	Evaluate
3	Explain some opinions of Muslim scholars regarding the number of Ayah and Surah in the holy Qur'an mentioning how the Ayah and Surah of the holy Qur'an were arranged.	10	4	Create

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International Islamic University Chittagong
Morality Development Program (MDP)

Midterm Examination, Spring 2023

Course Code: MDP- 2303

Course Title: *Tajweedul Qur'an-III*

Full Marks: 30

Time: 1.5 Hours

[Answer **any three** of the following. All questions are of equal value]

~~Q.1.~~ Write the meaning of the following *Surah* (any two):

~~d)~~ *Surah Al-Qariyah*

e) *Surah Al-'Adiyat*

~~f)~~ *Surah Az-Zilzal*

~~Q.2.~~ What does "*Lahn*" mean? Explain types of *Lahn* with examples.

Q.3. Define *Sifatul Huruf* (characteristics of letters). How many types of *Sifaatul Huruf* are there in *Tajweed* primarily? Explain *Qalqalah*, *Leen* & *Gunnah* with examples.

~~Q.4.~~ Describe the types of *Sifatul Huruf* (characteristics of letters) with opposites.

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International Islamic University Chittagong

Department of Computer Science & Engineering

Program: B.Sc. in CSE; Semester: 3rd

Mid Term Examination, Spring-2023

Course Code: CSE-2323

Time: 1 Hour 30 minutes

Course Title: Digital Logic Design

Total Marks: 30

Answer the following Three (3) questions. Each question carries 10 marks.

Question : 1	<p>a. Write down the advantages of digital systems over analog systems with proper example. 2</p> <p>b. Define redundancy theorem with proper example. 2</p> <p>c. Define Positive and negative logic with truth table. 2</p> <p>“Excess-3 code is self-complementary code” Is it true or false? Justify your comment.</p> <p>d. Compare between BCD Code and Binary numbers. 1+2=3</p> <p>Mentioned the rules applied for BCD Addition.</p> <p>e. Just one lines, write down the limitations of BCD Addition. 1</p>	
Question : 2	<p>a. How can we identify whether a code is self-complementary or not? Explain with proper example. 2+1+2=5</p> <p>Write down major properties of Gray Code.</p> <p>Convert 10110110 Gray Code into Binary Code.</p> <p>Or</p> <p>a. If we have 4 inputs NAND Gate then how many 2 input NAND Gates are required to implement it? 2+3=5</p> <p>Boolean expressions to NAND Gate implementation: $Y = A\bar{+}BC\bar{}$ ($\bar{}$ means Complement)</p> <p>b. What are the key features of Karnaugh map? Solve the following using Karnaugh Map: 5</p> <p>$F(A,B,C,D,E) = \sum m(0,1,6,7,8,9,21,22,23,29,31)$</p>	
Question : 3	<p>a. Mention the rules for designing combinational circuit with proper example. 3 4</p> <p>Or</p> <p>a. What are the necessary conditions for check board configuration? Justify it with Full Adder Circuit. 3 4</p> <p>b. Construct a Half Adder using NAND gates. 1 3</p> <p>c. Explain 2 bit comparator with proper circuit diagram. 1 2</p>	

N.B: The meanings of symbol enclosed in bracket ($\bar{}$) is complement.

****The End****

Bismillahir Rahmanir Rahim
International Islamic University Chittagong
 Department of Computer Science & Engineering
Mid Term Examination, Spring 2023
CSE 2321 Data Structures
 Total marks: 30 Time: 90 minutes

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

1. a) A library maintains a book list containing the following data for each book:
 Name of Authors, Title of Book, Edition, Publisher's Name, Year, ISBN
 i) State the *entities, attributes* and *entity set* of the list.
 ii) Which attribute can serve as the *primary key* for the list? 2 CO1
- b) Draw a *flowchart* for *linear search* algorithm 3 CO1
- Or
 Draw a *flowchart* to find the *largest element* of an array. 2 CO2
- c) What is the *time complexity* of the following functions? Explain.
- i)
 void swap()
 {
 int a, b, temp;
 temp = a;
 a = b;
 b = temp;
 }

iii)
 int add3(int n)
 {
 int i, sum = 0;
 for(i = 1; i < n; i *= 2)
 sum += i;
 return sum;
 }

ii)
 int add2(int n)
 {
 int i, sum = 0;
 for(i = 0; i < n; i += 2)
 sum += i;
 return sum;
 }

iv)
 int fun(int n)
 {
 int count = 0;
 for (int i = n; i > 0; i--)
 for (int j = 0; j < i; j++)
 count += 1;
 return count;
 }
- d) For the following pattern P and text T, find the number C of comparisons to find the INDEX of P in T using the *pattern matching algorithm* you studied. You have to show each step. 3 CO3
 P = aab, T = ababbabbbabaaabbb
2. a) Suppose ACAD maintains a linear array STUCGPA(23001:23099) such that STUCGPA[K] contains the CGPA of the student who bears the ID number K. Write a module for each of the following tasks- 2 CO3
- i) Print the ID Number of the students who have CGPA above 3.90.
 ii) Count the number of students who have CGPA above 3.30.

3 CO3
- b) Consider an array A (3:10, 1:10, -3:10). 3 CO3
- i) Find the *length* of each dimension and the *number of elements* in A.
 ii) Suppose Base (A) = 200 and w = 4 words per memory cell for A.
 Find the effective indices E₁, E₂, E₃ and the address of the element A [8, 6, 4] assuming A is stored in *row-major order*.

4 CO3
- c) Given a string **CHITTAGONG**, find the number of *comparisons* (C) and number of *interchanges* (D) needed to *sort* the string *alphabetically* by using *bubble sort* algorithm. Show each steps. 4 CO3
- Or
 Modify the *Binary Search algorithm* so that it becomes a search and insertion algorithm.
- d) What is the main i) advantage and ii) disadvantage of the Binary Search algorithm over the Linear Search algorithm? 1 CO1

3 a) Write a procedure to PUSH an item onto a stack and POP an item from the stack.

b) Suppose the following stack of integers is in memory where STACK is allocated $N = 8$ memory cells:

TOP = 4 STACK: 11, 22 33, 44, __, __, __, __

Describe the stack and TOP as the following operations take place –

- i) POP (STACK, ITEM) iii) PUSH (STACK, 66)
- ii) PUSH (STACK, 55) iv) POP (STACK, ITEM)

c) Consider the following postfix expression,

P: 3, 1, -, 2, ↑, N, 4, /, 2, *, +, 5, -

For which value of **N**, the result of this expression would be **XY**, where **XY** is the last 2 digits of your ID? [If your ID is C161026, then **XY** = 26] Use the algorithm you studied to solve this problem.

d) Consider the following *infix* expression Q:

Q: $(A * B \uparrow D) / (E - F) + G$

Translate Q into its equivalent *postfix* expression P using the algorithm you studied.

Or

Write an algorithm that receives a bracket sequence and tells whether the sequence is correct or incorrect.

For example, "()", "()[]{ }", "{ }[]" are correct sequences while, "{ }[])", "{ }]" are not. [You can safely assume that the required data structure and its operational algorithms are available to you to solve this problem. You don't need to re-implement them.]

International Islamic University Chittagong
 Department of Computer Science and Engineering
 B. Sc. in CSE Midterm Examination, Spring- 2023
 Course Code: STAT 2311 Course Title: Probability and Statistics
 Total marks: 30, Time: 1 hours 30 minutes
 [Answer all the questions; Figures in the right hand margin indicate full marks.]

CO DL

1. a) Explain the concept of variable with its importance in statistical research. 5 CO1 C4
 Classify the following variables as either qualitative or quantitative: Ethnicity, Number of siblings, Country of origin, Volume, Brain activity as measured via EEG.
 b) Distinguish between: (i) Primary data and secondary data. 5 CO1 C4
 (ii) Discrete variable and continuous variable.

2. a) Under what circumstances is it not possible to calculate the geometric mean? Describe the concept of weighted arithmetic mean with its application. 5 CO1 C2
 b) The following grouped frequency table shows the length of time, t , in minutes, visitors watched an octopus swimming around a tank at an aquarium. 5 CO1 C5

Time(t)	$0 < t \leq 5$	$5 < t \leq 10$	$10 < t \leq 15$	$15 < t \leq 20$	$20 < t \leq 25$	$25 < t \leq 30$
Visitors	4	3	7	5	2	1

Determine graphically the median and mode of the time visitors spent observing the octopus.

3. a) What do you mean by dispersion? Indicate the different measures of dispersion. Distinguish between mean deviation and standard deviation. 5 CO1 C4
 b) Following is the frequency distribution of life length in hours of 20 electric bulbs: 5 CO1 C4

Life Length	8.5-13.5	13.5-18.5	18.5-23.5	23.5-28.5	28.5-33.5
Frequency	3	5	7	4	1

Calculate the coefficient of variation (CV) and the standard error of mean (SEM) using the above data and comment on your results.

Or

- a) Suppose your midterm test score is 73 and your final exam score is 85. Using weights of 30% for the midterm and 70% for the final exam, compute the weighted average of your scores. If the minimum average for an A is 75, will you earn an A? 5 CO1 C4
 b) Using the numbers 2, 4, 8, 5, and 7, provide a justification for the following relationships: (i) $A.M \geq G.M \geq H.M$ (ii) $\sigma_x > MD_x$ 5 CO1 C5

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. Engineering in CSE

Mid term Examination, Spring- 2023

Course Code: CHEM-2301

Course Title: Chemistry

Time: 1 hour 30 minutes

Full Marks: 30

(i) Answer all the questions. The figures in the right-hand margin indicate full marks.

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

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

1) a)	What is periodicity? How electron affinity differs in Periodic Table and gives explanation with example and values? Or Write down the modern periodic law and mention some properties of modern periodic table. Discuss the classification of elements based on electronic configurations with examples.	CLO1	R/Un	2+3
1) b)	Write down the electronic configuration and find out the period and group of the following atomic number: i) Cr ₂₄ ii) Cu ₂₉ iii) Kr ₃₆	CLO2	An	2+3
2) a)	What is coordinate bond and Hybridization? Discuss the bond formation process with bond angle, structure, s-character and p-character of CCl ₄ , BCl ₃ and BeCl ₂ molecules through hybridization.	CLO1	R/Un	2+3
2) b)	What is the total number of sigma and pi bonds in the following molecules? (a) C ₂ H ₂ (b) C ₂ H ₄	CLO2	Un	2
2) c)	Analyze and show clearly- the bond formation and orbital diagrams of these molecules: NaCl and HCl.	CLO2	An	3
3) a)	Which one is possible-explain? - 1d, 2p, 3f, 4d.	CLO1	R/Un	3
3) b)	What is the difference between orbit and orbital?	CLO1	Un	2
3) c)	Briefly describe Bohr atom model with limitations. Or Write the three isotopes of carbon and find out their atomic number (Z), mass number (A), proton number (p) and neutron number (n). Comment on the physical and chemical properties of isotopes, isobars and isotones.	CLO2	An	3+2