International Islamic University Chittagong
Morality Development Program

Midterm Examination, Autumn-2023
3rd Semester ***(for Muslim Students only; other than Shari'ah faculty)***

Course code: MDP-2303

Course Title: *Tajweedul Qur'an*-III (Arts of correct recitation of the Qur'an)

Full Marks: 30 Time: 1 hour &30 minutes

Answer any **three (3)** of the following questions
(All questions are of equal value):

1. Write the meaning of the following Surahs: **(Any two)**
   a) *Surah Al-Qari'ah (سورة القارعة);*
   b) *Surah Aj-Jiljal (سورة الزلزال);*
   c) *Surah Al-Qadr (سورة القدر).*

2. Define *Lahn* literally and terminologically. How many types of *Lahn* are there in *Tajweed*? Explain their rules with examples.

3. (a) Define *Sifaatul Huruf* (Characteristics of Letters). How many types of *Siffaatul Huruf* are there in *Tajweed* primarily? Explain.

Or,

(b) How many types of *Sifatul Huruf Al-Lajimah* are there without opposite? Explain them mentioning their letters.

International Islamic University Chittagong
Department of Computer Science & Engineering
B.Sc. in CSE *Mid Term Examination* , Autumn -2023
Course Title: Mathematics-III Course Code: MATH-2307 (New)
Course Title: Mathematics-IV Course Code: MATH-2401 (Old)

Time: 1:30 hours Marks: 30

[Please answer the following questions . Figures in the right margin indicates full marks]

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1. a) Check whether it is singular matrix $A = \begin{bmatrix} 1 & e \\ 3 & f+1 \end{bmatrix}$; Where e and f are the digits of your own metric number CLO2 2

b) Find the inverse of $\mathbf{A} = \begin{bmatrix} \mathbf{1} & \mathbf{e+1} \\ \mathbf{3} & \mathbf{f+1} \end{bmatrix}$ making linear equations system; Where e and f are the digits of your own metric number CLO2 3

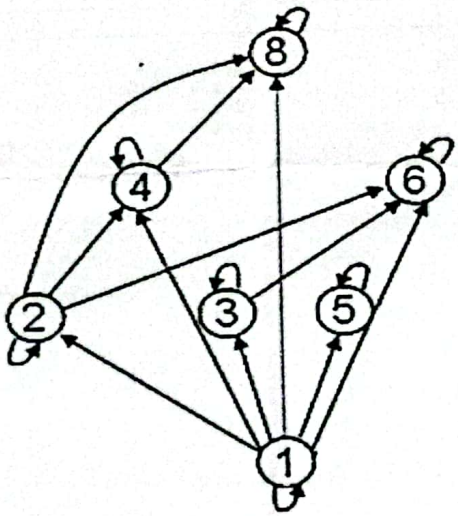
c) Construct the 3×3 Matrix A having: CLO1 3

$\mathbf{A = (a_{ij}) = 4i + j}$ **;when i > j**

$= \mathbf{d+1}$ **;when i = j** Where d is the digit of your own metric number

$= \mathbf{3i - j}$ **;when i < j**

Or



Create an adjacency matrix for the above figure

d) Find the area of the parallelogram constructed by the vectors $\vec{u} = \begin{bmatrix} -2 \\ 3 \end{bmatrix}$ and $\vec{v} = \begin{bmatrix} 4 \\ 3 \end{bmatrix}$ CLO2

Or

Test whether $\lambda_1 = f$ *and* $\lambda_2 = e$ are eigen values for $\mathbf{A} = \begin{bmatrix} 5 & 3 \\ 2 & \mathbf{d} \end{bmatrix}$; Where d, e and f are the digits of your own metric number

e) What do you mean by a rank of a matrix? CLO1

Or

Give an example of a tridiagonal Matrix

2. a) Determine which of the following vectors are Eigen vectors for $\mathbf{A} = \begin{pmatrix} 2 & \mathbf{d} \\ 1 & -3 \end{pmatrix}$ showing your analysis procedure graphically CLO2 5

(a) $\begin{pmatrix} 2 \\ e \end{pmatrix}$ (b) $\begin{pmatrix} \mathbf{f} \\ 2 \end{pmatrix}$; Where d, e and f are the digits of your own metric number

b) Solve the system of linear equations CLO2 5

$$x + y - z = 0,$$
$$2x + 4y - z = 0$$
$$3x + 2y + 2z = 0$$

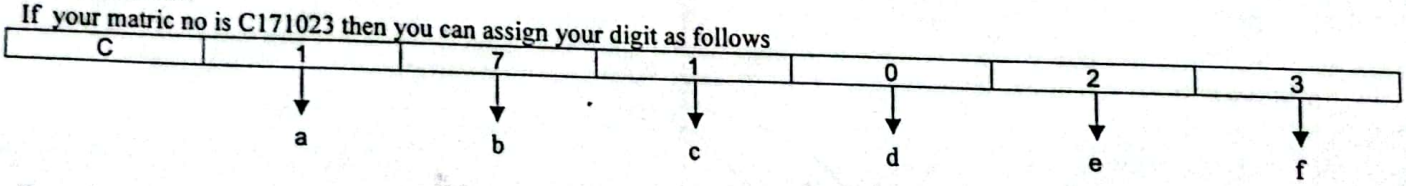
Or

A manufacturer receives daily shipments of 70,000 springs and 45,000 pounds of stuffing for producing regular and support mattresses. Regular mattresses r requires 50 springs and 30 pounds of stuffing; support mattresses s requires 60 springs and 40 pounds of stuffing. How many mattresses of each type should be produced daily to use all available inventories?

3. Diagonalize the matrix $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$ CLO2 10

Instructions:

If your matric no is C171023 then you can assign your digit as follows



To solve the above problem, you need to use your own metric number where needed

Bismillahir Rahmanir Rahim

International Islamic University Chittagong

Department of Computer Science & Engineering

Mid Term Examination, Autumn 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 company maintains an employee database with the following data for each employee: **2** **CO1**
Employee ID, Name, Department, Salary, Joining Date
i) State the *entities, attributes* and *entity set* of the list.
ii) Which attribute can serve as the *primary key* for the list?

b) Draw a *flowchart* for the *binary search* algorithm. **3** **CO1**
OR
Draw a *flowchart* for the *bubble sort* algorithm.

c) What do you mean by *complexity of algorithms*? What is the *time complexity* of the following functions? Explain. **2.5** **CO2**

i)
```
void fun1 (int N)
{
    int a = 0, i = N;
    do {
        a += i;
        i /= 2;
    } while (i > 0);
}
```

ii)
```
int fun2 (int n)
{   int i, j, sum = 0;
    for(i = 0; i * i < n; i++) {
        for (j = 1; j * j <= n; j++) {
            sum += i * j;
        }
    }
    return sum; }
```

d) Suppose, `S1 = "GLADIATOR", S2 = "DESH", S3 = "BAN"`. Evaluate and write the output of the following operations in order [Assume first Index of the string is 1]: **2.5** **CO2**
i) L = LENGTH (S3)
ii) S4 = DELETE (S1, 4, L + 3)
iii) S5 = S3 || S2
iv) S5 = INSERT (S5, 4, S4)
v) INDEX (S5, "NGL")

2.a) What is *linear array*? How can we represent a linear array in memory? **1** **CO1**
OR
What is *sparse matrix*? Describe how memory can be efficiently utilized by using a sparse matrix representation.

b) Consider a 2D array **A (5 : 10, 8 :15)**. **2** **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 address of the element **A [7, 10]** in *row-major order*.

c) Let A be *n x n* square matrix. Write a module which **3** **CO4**
i) Find the number NUM of *zero* elements in A.
ii) Find the SUM of the elements above the diagonal i.e. elements A[I, J] where I < J.

OR
Modify the *bubble sort* algorithm so that it will stop early if it detects that the list is already sorted.

d) Show the steps to search the ITEM = X and ITEM = Y from the following list of integers using *binary search* algorithm. 4 C

11, 22, 30, 35, 41, 45, 53, 66, 68, 71, 82, 89, 99

[*Here, X is the first two digits and Y is the last two digits of your ID. For example, if ID = C161026, then X = 16 and Y = 26*]

3.a) Suppose STACK is allocated **N = 8** memory cells and initially STACK is empty (i.e. **TOP = 0**). Find the output of the following module [show the elements of STACK and value of TOP in each step]- 2 CO1

1. Set A := 15 and B := 17
2. Call **PUSH** (STACK, A)
   Call **PUSH** (STACK, 5)
   Call **PUSH** (STACK, B - 3)
   Call **PUSH** (STACK, 10)
   Call **PUSH** (STACK, A * B)
   Call **PUSH** (STACK, 9)
3. Repeat while TOP ≠ 0:
   Call **POP** (STACK, ITEM)
   Write: ITEM
   [End of loop]
4. Return

b) Write an algorithm/code to *reverse* the elements of a stack. 2.5 CO3

c) Given a postfix expression: 2.5 CO3

Q: 9, -4, +, 3, ↑, N, 4, -, 2, *, +, 5, -

For what value of **N**, the result of the expression **Q** would be **XY**.

[*Here, XY is the last two digits of your ID. For example, if ID = C161026, then XY = 26. The result of any division operator must be taken 2 places after the decimal point. For example, 26 / 5 = 5.20*]

d) Consider the following *infix* expression Q: 3 CO3

Q: **A * (B - D) ↑ E + F * (G – H / K)**

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

OR

Suppose a stack supports the following operations in constant time complexity (O(1)):

push(x): Pushes an element x onto the stack.
pop(): Removes the element on top of the stack.
top(): Retrieves the element on top of the stack.
getMin(): Retrieves the minimum element in the stack.

Now write algorithms/code of the push(x) and getMin() functions for this special stack

International Islamic University Chittagong

Department of Computer Science & Engineering

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

Mid Term Examination, Autumn-2023

Course Code: CSE-2323 **Course Title: Digital Logic Design**

Time: 1 Hour 30 minutes. **Total Marks:** 30

Answer the following Three (3)questions. Each question carries 10 marks. Parts of the same questions must be answered serially.

Question : 1	a. Mention the limitations of BCD addition. Define 'Stuck at 0' and 'Stuck at 1'.What are the unique property of Excess-3 code? b. Verify whether 7421 & 3321 are self-complementary code or not. Define the steps associated for converting Binary to Gray code conversion with proper example. Describe Hamming code with proper example. c. If received hamming code is 1110101 with even parity then detect and correct error.	3 1+2+2=5 2
Question : 2	a. Boolean expression to NAND gate implementation: Y=A`+BC` Or a. Minimize the following Boolean functions using K-map with don't care conditions: F(A,B,C,D,E)=Σm(1,2,5,9,13)+Σd(3,6,11,15) b. Write down the steps required for designing a combinational circuit.Design a combinational circuit with four inputs and four outputs. The output generates the 2's complement of the input binary number.	5 5 5
Question : 3	a. Describe 2 bits comparator with proper circuit diagram. Or a. Describe 4 by 2 priority encoder with proper circuit diagram b. What are the advantages and disadvantages of multiplexer? c. Explain decimal to BCD encoder.	5 5 2 3

N.B: The meanings of symbol enclosed in bracket (`) is complement.

****The End****

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Midterm Examination, Autumn- 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)	Define statistics as a subject and explore its connection with data science.	4	CO1	C2
b)	What is the difference between discrete and continuous variables? Identify whether these variables are discrete/continuous or qualitative? (i) The temperature of a CPU or a server (ii)The amount of memory being used by a process (iii) Program execution time (iv) The count of clicks on a IIUC webpage (v) The programming language being used in a project.	6	CO1	C5
2.				
a)	Explain the procedure for calculating the geometric mean, harmonic mean, and median of ungrouped data using illustrative examples. Write down the formulae for computing Q_3, D_8 and P_{87} from a grouped frequency distribution.	4	CO1	C2
b)	A database administrator is monitoring the response times of queries in a database system. The response times are grouped into intervals (in milliseconds) as shown in the frequency table below:	6	CO1	C4

Response Time (ms)	0-10	10-20	20-30	30-40	40-50
Frequency	3	8	12	5	2

Calculate (i) the mean and median response time for the queries (ii) 1st quartiles, 6th deciles and 78th percentiles (iii) Draw an ogive curve and hence locate median and third quartile.

3.					
a)	Define mean deviation and coefficient of variation (CV). Discuss how measures of dispersion can help identify code sections that exhibit inconsistent execution times, aiding developers in optimizing software performance.	4	CO1	C2
b)	A software company is assessing the following performance of two programmers, Shafeen and Shahariar in terms of the number of lines of code they write per hour. Shafeen 's coding speed over five days: 130, 135, 125, 140, 150 Shahariar 's coding speed over five days: 120, 125, 130, 135, 150 Calculate the coefficient of variation for both Shafeen and Shahariar and determine who has a more consistent coding speed.	6	CO1	C4
	Or			
a)	Explain the following statistical terms with example (Any two): (i) Population (ii) Variable (iii) Secondary data (iv) Questionnaire	4	CO1	C2
b)	In a software development team, the time (in hours) taken to complete code reviews was recorded: 8, 5, 9, and 7 Using the data justify: (i) $A.M \leq G.M \leq H.M$ (ii) $A.M \times H.M = GM^2$	6	CO1	C5

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. Engineering in CSE

Mid term Examination, Autumn- 2023

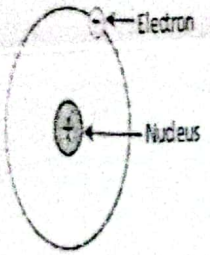
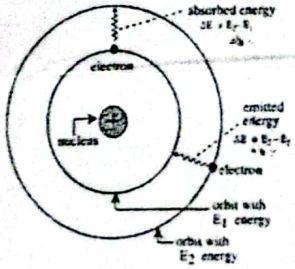
Course Code: **CHEM-2301** Course Title: **Chemistry**

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)	Define atom describe the three permanent fundamental particles	CLO1	R/Un	1+2
1)	b)	Follow the figures and answer the following question  Model –A  Model-B Which model is much acceptable and why mentioning the postulates.	CLO2	An	5
1)	c)	Suppose an electron is in 4f orbital. Find out the four quantum number values for it.	CLO3	Ap	2
2)	a)	Write down the electronic configuration and find out the period and group of the following atomic number: i) Cl_{17} ii) Zn_{30} iii) Xe_{54} **Or** Explain Ionization potential (I.P.). Why I.P. value of "N" is higher than "O"?	CLO1	R/Un	3
2)	b)	Why and how atoms combine together?	CLO2	Un	2

2)	c)	Analyze and show clearly- the bond formation and orbital diagrams of these molecules: KCl and NH_3. **Or** Write the three isotopes of Oxygen 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	5 3+2
3)	a)	Write the modern periodic law. Write the properties of modern periodic table. **Or** Why 3f is not possible? What is the difference between orbit and orbital?	CLO1	R/Un	1+2
3)	b)	Discuss the classification of elements based on electronic configuration with definitions and examples.	CLO3	An	3
3)	c)	Arrange the following orbitals according to their higher energy- 3d, 4s, 5p, 6s, 4f, 7s, 6d, 7p	CLO3	An	2
3)	d)	Discuss the electronic Configuration of Cr_{24} and Cu_{29} .	CLO2	Un	2

International Islamic University Chittagong
Center for General Education (CGED)
Midterm Examination, Autumn–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 the holy Qur'an literally and terminologically explaining the necessity of the holy Qur'an in our life. Or, b) Make a comparison among all Books and Scriptures proving the superiority and authenticity of the holy Qur'an.	10	2	Remember & Create
2	"The procedures of Wahi of Prophet (SAAS) were different"- evaluate this statement explaining some important types of the Wahi identifying the Wahi as the best source of knowledge.	10	2	Evaluate & Create
3	Define Ayah and Surah. Explain some opinions of Muslim scholars regarding the order and arrangement of Ayah and Surah of the holy Qur'an.	10	2	Remember & Create

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