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International Islamic University Chittagong

Department of Computer Science & Engineering

Mid Term Examination, Autumn 2022

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 professor keeps a class list containing the following data for each student: Name, ID Number, Section, Total Marks, Final Grade 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	C2
b)	Draw a *flowchart* for the *binary search* algorithm. OR Draw a *flowchart* for the bubble sort algorithm.	3	CO1	C2
c)	What do you mean by *complexity of algorithms*? Analyze the complexity of the *linear search algorithm.*	2.5	CO2	C2
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. **P = abba, T = abaabaaabbbaabbab**	2.5	C03	C3
2. a)	What is *linear array*? How can we represent a linear array in memory? OR How a 2D *array* is represented in computer memory? Explain with example.	1	CO1	C2
b)	Consider a 2D array **A (5 : 10, 8 :15).** 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 [8, 12]** in *row-major order*.	2	C03	C3
c)	Let A be ***n x n*** square matrix. Write a module which 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**.	3	CO4	C5

d) Given a string **CONVOCATION**, find the number of *comparisons* (C) and number of *interchanges* (I) needed to *sort* the string *alphabetically* by using *bubble sort* algorithm. Show each steps. 4 CO3 C4

OR

Show the intermediate steps to search the **ITEM = 41** and **ITEM = 97** from the following list of integers using *binary search* algorithm.

21, 25, 30, 35, 41, 45, 53, 66, 68, 71, 82, 89, 101

3. a) What is *stack*? Write a procedure to **PUSH** an item onto a stack and **POP** an item from the stack. 2.5 CO1 C2

OR

If **P** be an arithmetic expression written in *postfix expression*, write an algorithm to evaluate **P**, using a stack to hold operands

b) Suppose STACK is allocated **N= 6** 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 C2

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1. Set AAA := 10 and BBB := 20
2. CALL PUSH(STACK, AAA)
   CALL PUSH(STACK, 5)
   CALL PUSH(STACK, BBB+3)
   CALL PUSH(STACK, 15)
   CALL PUSH(STACK, AAA+BBB)
3. Repeat while TOP ≠ 0:
     CALL POP(STACK, ITEM)
     Write: ITEM
   [End of loop.]
4. Return.
```

c) Consider the following arithmetic expression **P**, written in *postfix* notation: 2.5 CO3 C3

P: 20, 7, 3, - , / , 5, 2, 8, - , * , +

Evaluate **P**, using the algorithm you have studied.

d) Consider the following *infix* expression **Q**: 3 CO3 C3

Q: A * (B - D) ↑ E + F * (G – H / K)

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

International Islamic University Chittagong
Center for General Education (CGED)
Midterm Examination, Autumn–2022

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

Full Marks: 30 **Time: 1:30 Hours**

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

1. Define the holy Qur'an literally and terminologically. How many names of the holy Qur'an are there? Explain some of them properly.

2. "The holy Qur'an has some unique features from any other worldly and heavenly books"- justify this statement by explaining some essential characteristics of the holy Qur'an.

3. "The ways and means of the revelation of *Wahi* are different"- evaluate this statement explaining some important classifications of Wahi properly.

4. "The holy Qur'an was revealed through some stages"- what are these stages? And why?

5. Define Ayah and *Surah* literally and terminologically. Explain some important types of *Surah* properly.

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International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Midterm Examination, Autumn- 2022

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. How is probability and statistics used in computer engineering?	4	CO1	C2
b)	Suppose a researcher wants to find the average systolic blood pressure of the employees of a big firm. For this purpose, a sample of 80 employees has been selected randomly from that firm and their systolic blood pressure measurements have been obtained. (i) Identify the population, sample, variable, and data for the above example. (ii) What kind of variable is "systolic blood pressure"? (iii) Distinguish between discrete and continuous variable.	6	CO1	C6
2.				
a)	What do you mean by measures of central tendency? Describe the method of determining geometric mean and harmonic mean.	4	CO1	C4
b)	The following data shows the yearly temperature of north Bengal of Bangladesh:	6	CO1	C3

Temperature (°C)	5-10	10-15	15 -20	20-25	25-30	30-35
# of days	2	4	11	7	4	1

(i) Find average yearly temperature (ii) Compute the modal temperature. (iii) Using the cumulative frequency curve, determine the median temperature.

3.						
a)	Explain mean deviation and standard deviation. Show that the standard deviation of first n natural number is $\sqrt{\frac{n^2-1}{12}}$	4	CO1	C4
b)	The lives (in hours) of 50 randomly selected flashlight batteries are:	6	CO1	C5

Class interval	6.95 to 7.45	7.45 to 7.95	7.95 to 8.45	8.45 to 8.95	8.95 to 9.45	9.45 to 9.95
Frequency	2	10	13	11	5	4

Using the above data verify that $\sigma_x > M.D(\bar{x})$

Or

a)	Write your birthday into ddmmyyyy format and separated each digit by commas. Compute the coefficient of variation of these digits.	4	CO1	C4
b)	Find the arithmetic mean and standard deviation of the first n natural number whose frequencies are equal to the corresponding numbers.	6	CO1	C6

International Islamic University Chittagong

Department of Computer Science and Engineering

Mid Examination, ~~Spring~~ Autumn 2022

Course Code: CHEM- 2301 **Course Title: Chemistry**
Total Marks: 30 **Time: 1.5 Hours**
Semester: 3rd

Answer the following questions

1. a) How will you distinguish between Isotope and Isobar? 3 CO1

OR

Fill in the gaps of the following table and Find out the isotopes, isobars and isotones from it and also write their chemical formulae.

Name	Atomic number (Z)	Mass number(A)	Proton number (p)	Neutron number(n)
A	6			6
B		64		36
C		30	14	
D		14		8
E			30	34
F		32		16

b) Na and K are in the same group in the periodic table. Based on their locations show the differences in their a) Atomic Radius b) Ionization potential c) Electronegativity. 3 CO2

OR

Discuss the classification of elements based on electronic configuration. Find out the period and group of the following elements-

a) Ar (18) b) Zn (30)

c) Write a note on Octet theory of valency and its limitations. 2 CO2

OR

Discuss the electronic configuration of Cr (24) and Cu (29)

d) Write the difference between orbit and orbital. 2 CO1

2. a) Arrange the following orbitals according to order of higher energy- 7p, 6d, 3d, 5d, 4f, 4s 3 CO2

OR

Write a note on Aufbau Principle and its limitations.

b) Which of the following sets of quantum numbers are allowable or not allowable and why? 3 CO2

i. n=4	*l*=1	m=+1	s= +1/2
ii. n=2	*l*=0	m=-2	s= -1/2
iii. n=3	*l*=3	m= 0	s= +1/2
iv. n=4	*l*=2	m=+2	s= -1/2
v. n=1	*l*=0	m= 0	s= +1/2
vi. n=4	*l*=3	m= +4	s= -1/2

OR

Show the formation of N_2 using MOT. Is it paramagnetic or diamagnetic?

c) *Why 3f is not possible?* 2 CO2

d) *Suppose an electron is in 4f electrons. Find out the probable four quantum number values for it.* 2 CO3

3. a) State the Modern Periodic Law. What are its features? 2 CO1

b) Why and how atoms combine together? 2 CO1

c) Define Hybridization of orbitals. Discuss the SP^2 and SP Hybridization process and draw diagrams showing the formation of a double bond and a triple bond between carbon atoms in C_2H_4 and C_2H_2 molecules. Also mention the bond angles, shapes, s-character and p-character. 4 CO3

OR

Define Hybridization of orbitals. Find the number of sigma and pi-bonds in the following molecules:
H_2O b) C_2H_4 c) C_2H_2 d) SO_3

d) Discuss the ionic bond with suitable example end necessary diagrams. 2 CO3

International Islamic University Chittagong

Department of Computer Science & Engineering

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

Mid Term Examination, Autumn-2022

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.

Question : 1	a. Design a 4 bit parallel adder using full adders. Define 'Stuck at 0' and 'Stuck at 1'.	3+1=4
	b. Boolean expression to NOR gate implementation is: $Y=A'+BC'$ Implement the above Boolean expression in terms of AOI.	2
	c. How many two input NAND required to implement 4 input AND gate? Minimize the following Boolean functions using K-map: $F(A,B,C,D,E)=\Sigma m(0,1,6,7,8,9,21,22,23,29,31)$	1+3=4
Question : 2	5 bit data 01101 is given. Represent given data in Hamming Code.	5
	Or	
	a. If received hamming code is 1110101 with even parity then detect and correct error.	5
	b. Design a combinational circuit with three inputs, x, y and z, and the three outputs, A, B, and C, when the binary input is 0, 1, 2, or 3, the binary output is one greater than the input. When the binary input is 4, 5, 6, or 7, the binary output is one less than the input.	5
Question : 3	a. State Redundancy theorem with proper example.	3
	Or	
	a. Define characteristics of positive logic, negative logic and self-dual.	3
	b. A logic circuit have three inputs A, B & C. The output F is high when the majority of inputs are logic 1. 1. Minimize the function 2. Implement the circuit	3
	c. Using proper algorithm ,convert 1011 to Gray code	1
	d. State the steps required for designing a combinational circuit with proper example.	3

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

****The End****

International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
B. Sc. in CSE, Mid Term Examination, Autumn-2022
Course Code: MATH-2307, Course Title: Mathematics-III

Time: 1:30 hours | Marks: 30

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

			Marks	CLO	DL
1.	a)	If $A = [a_{ij}]$ where $a_{ij} = \begin{cases} 0, when\ i \neq j \\ C, when\ i = j \end{cases}$ Construct a 3×3 order matrix and Identify the type of matrix. Also test the matrix A is Orthogonal or not ***Where C is the sum of the 1st digit & the last digit of your ID***	5	CLO1	C2
	b)	What is Augmented Matrix? Give one example	2	CLO1	C2
	c)	Find the area of the parallelogram defined by the column matrices $\mathbf{u} = \begin{bmatrix} -4 \\ 4 \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 6 \\ 2 \end{bmatrix}$	2	CLO1	C2
	d)	Name 4 methods of finding the inverse of a matrix	1	CLO1	C2
2.	a)	Check whether the vectors $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$ and $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$ are Eigen vectors for $A = \begin{pmatrix} 1 & 6 \\ -4 & 7 \end{pmatrix}$ showing your analysis procedure graphically (using of graph paper is not mandatory)	3	CLO2	C2
	b)	Prove that the set of vectors {(2, 1, 2), (0, 1, -1), (4, 3, 3)} are linearly dependent.	3	CLO2	C2
	c)	Prove that $A = \begin{bmatrix} 2 & 2-3i & 3+5i \\ 2+3i & 3 & i \\ 3-5i & -i & 5 \end{bmatrix}$ is Hermitian	2	CLO2	C2
	d)	Determine whether $\lambda_1 = 5$ *and* $\lambda_2 = 4$ are eigen values for $A = \begin{bmatrix} 11 & 3 \\ -5 & -5 \end{bmatrix}$	2	CLO2	C2
3.	a)	Using matrix method, solve the following equations, $x + y + z = 6$, $z - y + z = 2$ *and* $2x + y - z = 1$	5	CLO2	C2
	b)	Verify the *Cayley-Hamilton* theorem and hence find A^{-1} for $A = \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$	5	CLO2	C2
		Or			
3.		Diagonalize the matrix $A = \begin{pmatrix} 1 & 4 \\ 4 & 1 \end{pmatrix}$	10	CLO2	C2

International Islamic University Chittagong

Morality Development Program
Midterm Examination, Autumn-2022
3rd Semester (for Muslim Students only; other than Shari'ah faculty)
Course code: MDP-2303

Course Title: Tajweedul Qur'an-III

Full Marks: 30 Time: 1: 30 Hours

Answer any three of the following questions:

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

2. "*Lahn* (Error) during the recitation of the holy Qur'an is forbidden strictly"- justify this statement explaining the definition and types of *Lahn* from the viewpoint of *Tajweed* with examples.

3. "There are some types of *Sifaatul Huruf* (Characteristics of letters) with opposites"- explain adequately.

4. Define *Sifaatul Huruf* (Characteristics of letters). How many categories of it are there in *Tajweed*? Locate *Al-Jahr*, Al-*Shiddah*, *As-Safeer*, and *Al-Qalqala* with *Sifaatul Huruf* (Characteristics of letters) with opposites and without opposites.

International Islamic University Chittagong (IIUC)

Mid Term Lab Examination, 2022

Subject: Computer Science and Engineering

Course no.: Chem – 2304

Full Marks: 30 **Time: 1 Hour**

[Answer any **three** questions. The figures in the right margin indicate marks.]

1. a) What is qualitative analysis? What are the general lab safety rules? 6
   b) What are the objective of qualitative analysis? 4
2. a) Write the definition of titration? What is indicator? 5
   b) What are the essential conditions for accurate titration? 5
3. Write note on: i) Normality ii) Molarity iii) Molality 10
4. a) How will you distinguish between Primary and Secondary standared substances? 5
   b) Write short note on i) Absolute error and ii) Relative error 5
5. What is the normality of H_2SO_4 solution that contains **24.5** g solute in a total volume of **100** ml? 10