International Islamic University Chittagong

Morality Development Program

Mid Term Examination Spring -2024

Semester: 4th (*other than Shari'ah faculty)*

Course Title: Concepts on Moral Development –I Course Code: MDP-2404

Time: 1 Hour 30 Minutes Total Marks: 30

Answer the following questions. All questions are of equal value.

1. Discuss the basis of morality in Islam. What are the causes of moral degradation? Discuss its solution. 10

2. "Family is the peaceful residence and great shelter of human life bu is intrinsic peace is threatened now a days." Explain it in the light of Quran and Sunnah 10

3. Describe the way of behavior of a child with respect to his or her p: its and vice versa in light of Islamic principles. 10

Or

What are the guidelines of Islam about suicide? Discuss the remedies prevent it.

teaches (ID, course_id, sec_id, semester, year)
student (ID, name, dept_name, tot_cred)
takes (ID, course_id, sec_id, semester, year, grade)

Consider the relational database of a university database management system, where the primary keys are underlined. Write **queries in relational algebra** to answer the following questions -

1. Find the ID, name and salary of each instructor in the Physics department or those having salary greater than $40,000
2. Find the ID and name of each instructor in a department located in the building 'Watson'
3. Find all the courses taught in the Fall 2023 semester but not in Spring 2024 semester.
4. Find the ID and name of those instructors who earn more than the instructors in the Physics department.

OR,

1. Find all instructor whose salary is above average for their department
2. Find all courses taught in both the Fall 2022 semester and in the Spring 2022 semester
3. Find all students who have taken all courses taught by instructor named 'John Doe'
4. List all departments along with number of students in each department.

International Islamic University Chittagong

Department of Computer Science and Engineering

B. Sc. in CSE Mid-term Examination, Spring 2024

Course Code: **CSE 2423** Course Title: **Database Management System**

Total marks: 30 *Time: 1 hour 30 minutes*

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

			CO	DL
1.				
a)	Define **Database Management System**. Write about **any two** of the real-life applications of Database Management System.	2	CO1	R
b)	Describe about relational and object-oriented data model.	3	CO1	U
c)	Explain with example, how database management system resolve the problems of redundancy and atomicity	5	CO2	Ap
2.				
a)	Consider the following specifications for designing a travel planning platform: - Each user should have a unique user ID and associated profile details. - Users can create multiple itineraries, each associated with a particular user. - Each lists should include various destinations, and destinations may appear in multiple itineraries. - Users can review accommodations, transportation, and attractions, each having associated details and ratings. - The social component allows users to connect with friends, share itineraries, and view each other's travel experiences. Design the **E-R diagram** for the above ***problem***. Consider all the necessary mapping cardinalities, attributes and participation constraints. Your database should store information the relationships between users, lists, destinations, reviews, and social interactions and encode the following information.	5	CO1	Ap
b)	Construct an ER-Diagram of 3 levels for Vehicles such as Bus, Truck and Rickshaw **using specialization and generalization hierarchy system.** Justify your placement of attributes at each level of the hierarchy.	3	CO1	Ap
c)	Write down the problems of using Cartesian Product. How could it be resolved? Explain with example. **OR** Why should we avoid natural join? Explain with example	2	CO2	U
3.				
a)	Write names of **2 aggregate functions** with their syntax in relational algebra.	2	CO1	R
b)	**classroom** (<u>building</u>, <u>room_number</u>, capacity) **department** (<u>dept_name</u>, building, budget) **course** (<u>course_id</u>, title, dept_name, credits) **instructor** (<u>ID</u>, name, dept_name, salary) **section** (<u>course_id</u>, <u>secid</u>, <u>semester</u>, <u>year</u>, building, room number, time slot id)	8	CO1	Ap

		Required i. Analyze the effects of the above transactions on the accounting equation of HHH Solutions. ii. Prepare an income statement.			
3)		Mrs. Tania started and operates an event management business firm named **Daily Success** on January 01, 2024 and had the following on January 31 2024: Cash \$50,000, furniture \$ 5,000, capital \$40,000 and account payable \$15,000. During this month the following transactions took place: a) Tania invested \$70,000 cash in a business bank account and Furniture valued \$10,000. b) Paid \$20,000 for a building to be used as an office. c) Purchased office supplies \$2,000 on account. d) Performed service for a client and received cash of \$2,000. e) Paid \$5,000 of business fund for her family maintenance. f) Arranged a corporate event and billed the client for services rendered, \$5000. **Required:** i. Record each transaction in the journal. ii. Post the transactions in to the ledger. iii. Prepare a trial balance.	CO2	C5	10
		OR			
3)		Andrea Scarlett is a realtor. She organized her business as a corporation, Andrea Scarlett, Realtor, P.C. (Professional Corporation) 1. The business owes \$61,000 on a note payable for land that the business acquired for a total price of \$83,000. 2. The business spent \$23,000 for a Zinka Banker real estate franchise, which entitles the business to represent itself as a Zinka Banker office. This franchise is a business asset. 3. Scarlett owes \$80,000 on a personal mortgage for her personal residence, which she acquired in 2012 for a total price of \$160,000. 4. Scarlett has \$5,000 in her personal bank account, and the business has \$9,000 in its bank account. 5. Scarlett owes \$(Last Four digit of your student ID) on a personal charge account with Chico's. 6. The office acquired business furniture for \$15,000 on Sep 25. Of this amount, the business owes \$2,000 on account at September 30. 7. Office supplies on hand at the real estate office total \$1,300. 8. Received partial payment from client on account, \$2700 9. Received \$1,500 cash for helping a client. 10. Scarlett received a birthday gift from his friend valued \$3000. **Required** i. Post the transaction to the ledger with label the balance of each account. ii. Prepare a Trial Balance .	CO2	C5	10

International Islamic University Chittagong
Department of Computer Science and Engineering
B. Sc. Engineering in CSE
Midterm Examination, Spring 2024

Course Code: **ACC 2401** Course Title: **Financial Managerial Accounting**

Time: 1 hour 30 minutes Full Marks: 30

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

Course Outcomes (COs), Program Outcomes (POs) and Bloom's Levels (BL) of the Questions			
CO	**CO Statements**	**PO**	**BL**
CO1	Explain the basic concept of financial accounting, cost accounting and management accounting.	PO11	C2
CO2	Analyze the basic concept of Cost Accounting and preparation of Cost Sheet.	PO11	C4
CO3	Apply the tools from accounting and cost accounting this would facilitate the decision making i.e. Budgeting, Make or Buy decision.	PO11	C3
CO4	Compare the different business situations and suggest to best solution with analytical abilities.	PO11	C5

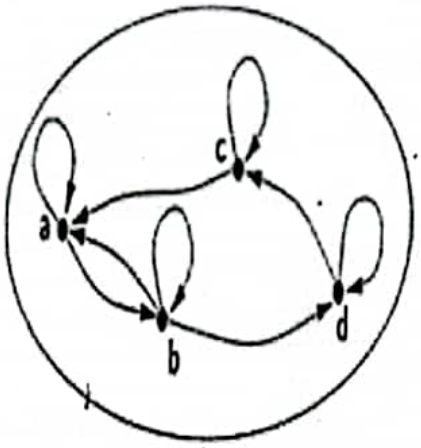
Bloom's Levels (BL) of the Questions						
Letter Symbols	**C1**	**C2**	**C3**	**C4**	**C5**	**C6**
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

1)	a)	What does the term "Accounting" encompass, and how is it related to the concept of an accounting period? Additionally, what constitutes a Financial Statement?	CO1	C2	4
1)	b)	"An internal claim in a business is owners' equity." Put your detailed accounting equation explanation here along with your explanation of this statement.	CO1	C2	6
2)		Mr. Hasan owns and operates a software firm called HHH Solutions. The following amounts summarize the financial position of the business on December 31, 2023: Cash $19000, Land $60000, Account Receivable $5000, Capital $ 80000, Accounts Payable $4000. During January 2024 the following transactions occurred: Jan.1 Mr. Hasan sold his inherited land for $50,000 and deposited $20000 cash in the personal bank account and $30000 in the business bank account. Jan. 5 Signed an agreement to develop a software for a corporate client. Jan. 10 Paid on account $2000. Jan. 15 Purchased office supplies on account, $1500. Jan. 16 Collected cash on account, $4000. Jan. 20 Develop a software for the corporate client and billed $12000. Jan. 25 Paid office rent $3000 and utilities $2000. Jan. 30 Sold a piece of land for $20000. Cash received $15000 and remaining will be collected later. Jan 31 Purchased a car for Mr. Hasan's family use for $8000 paying by the business bank account.	CO2	C4	10

International Islamic University Chittagong (IIUC)
Department of Computer Science and Engineering (CSE)
B. Sc. in CSE, Mid Term Examination, Spring-2024
Course Code: MATH-2407, Course Title: Mathematics-IV

Time: 1:30 Hours | Marks: 30

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

			Marks	CLO	DL
1	a)	Let the function $f: R^+ \to R^+$ be defined by $y = f(x) = x^2 + x - 1$ then find the value of $f^{-1}(10)$	2	CLO1	C2
	b)	Prove De-Morgan's theorem $(A \cup B)' = A' \cap B'$	2	CLO1	C2
	c)	 Determine whether the above relation is Anti-symmetric and Transitive	2	CLO1	C2
	d)	Using Demoivres theorem find the quadratic equation whose roots are the n-th power of the roots of the equation, $x^2 - 2x\cos\theta + 1 = 0$ Or	4	CLO1	C2
		If $(1+i\frac{x}{a})(1+i\frac{x}{b})(1+i\frac{x}{c})\ldots\ldots\ldots = A + iB$, Then prove that $(1+\frac{x^2}{a^2})(1+\frac{x^2}{b^2})(1+\frac{x^2}{c^2})\ldots\ldots\ldots\ldots = A^2 + B^2$	4	CLO1	C2
2	a)	A straight line joining $A(-j)$ and $B(2+j)$ in the z-plane is mapped onto the w-plane by the transformation equation $w = \frac{1}{z}$	8	CLO1	C2
	b)	Test the function $f(x,y,z) = x^2y + y^2z + z^2y$ is harmonic or not. Or	2	CLO2	C3
		Determine the function, $w = e^z$ is regular (analytic) or not.	2	CLO2	C3
3	a)	Evaluate the integral $\int_c \bar{z}\,dz$ from $z = 0$ to $z = 2 + i$ along the curve c.	6	CLO2	C3
	b)	Using Cauchy's Integral Formula evaluate $\int_c \frac{z}{z^2 - 3z + 2}dz$ where c is the circle $\lvert z - 1\rvert = \frac{1}{2}$ Or	4	CLO2	C3
		Evaluate $\int_c \frac{2z+1}{z^2+z}dz$ Where c is the circle $\lvert z\rvert = \frac{1}{2}$	4	CLO2	C3

International Islamic University Chittagong
Center for General Education (CGED)
Midterm Examination Spring- 2024
Course Code: GEBL-2401
Course Title: Bangla Language and Literature
Full Marks: 30 Time: 1.5 Hours

ক-বিভাগ
ভাষা ও নিমিতি:২০
(প্রতিটি প্রশ্নের মান সমান।)

প্রশ্ন নং	বর্ণনা	মান	CLO	Cognitive learning
০১.	"বাংলা ভাষার উৎপত্তি ও বিকাশ" -শীর্ষক একটি প্রবন্ধ উপস্থাপন কর।	১০	CLO1	Create
০২.	নিচের পরিভাষাগুলোর পরিচয় দাও:			
	বাংলা মৌলিক স্বরধ্বনি, স্বরধ্বনি বিচারের মাপকাঠি, স্পর্শ ধ্বনি, ওষ্ঠ্য ধ্বনি, অঘোষ ধ্বনি।	৫×২=১০	CLO1	Understand
	অথবা,			
	" ট্রান্সজেন্ডার ইস্যু ও আমাদের ভূমিকা" -শিরোনামে একটি সাধারণ প্রতিবেদন রচনা কর।	১০	CLO1	Create

খ-বিভাগ
সাহিত্য:১০

প্রশ্ন নং	বর্ণনা	মান	CLO	Cognitive learning
০১.	"পঞ্চাশের মন্বন্তরের ভেতর-বাইরের বাস্তবতার গল্প **নয়নচারা**" -উক্তির যথার্থতা নিরূপণ কর।	১০	CLO3	Evaluate

International Islamic University Chittagong
Department of Computer Science and Engineering
B. Sc. in CSE, Mid Term Examination, Sprint 2024

Course Code: CSE 2421 Course Title: Computer Algorithms

Time: 1 hour and 30 minutes **Full Marks: 30**

[Answer the following questions]

		P	C	D
1.a)	Given an algorithm with a time complexity of O(n^2) and another with a time complexity of O(nlogn),discuss under what circumstances each algorithm would be preferable in terms of efficiency. Provide real-world examples to support your analysis.	3	2	1
b)	Discuss the properties of a good algorithm. How do these properties influence the efficiency and effectiveness of an algorithm in solving a given problem?	3	2	1
c)	Analyze the time complexity of the following algorithm, which computes the factorial of a non-negative integer n:	4	2	1

```
function factorial(n):
if n equals 0:
   return 1
else:
   result = 1
   for i from 1 to n:
      result = result * i
   return result
```

Explain the number of operations performed by the algorithm and justify its time complexity using Big O notation. Consider both the best-case and worst-case scenarios.

OR

c)	Find the complexity of the followings:	4	2	1

i)
```
void fun(int n) {
    int i, j, k, count = 0;
    for( i= n/2; i<=n; i++)
        for( j=1; j+n/2 <= n; j++)
            for( k=1; k<=n; k=k*2)
                count++;
}
```

ii)
```
void fun(int n) {
  if(n <=1) return;
  int i,j;
  for( i=1; i<=n; i++)
      for (j=1; j<=n; j++){
          printf("Hello\n");
          break;
      }
}
```

2. a)	Given an array of integers: [7, 2, 1, 6, 8, 5, 3, 4], apply the count-sort algorithm to sort this array. Provide a step-by-step sorting process for the algorithm.	4	3	1
b)	Consider the following recurrence relation: $T(n)=2T(n/2)+n$. Apply the master theorem and recurrence tree method to analyze the time complexity of this recurrence relation.	3	4	2
c)	Starting with the procedure MAX-HEAPIFY, write pseudocode for the procedure MIN-HEAPIFY(A,i), which performs the corresponding manipulation on a min-heap.	3	5	2

OR

c)	Show the steps of the operation **Extract-min()** on the following **min-heap** $A = \{4, 1, 3, 2, 16, 9, 10, 14, 8, 7\}$	3	5	2
3. a)	Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is $\{6, 5, 4, 8, 6\}$.	6	3	1
b)	Given two strings: "abcdefgh" & "acbcfhgh", Apply dynamic programming to find the longest common subsequence (LCS) between these two strings.	4	3	2

OR

b)	Explain the concept of dynamic programming in the context of solving optimization problems. Illustrate the dynamic programming approach with an example to find the optimal solution.	4	3	2

International Islamic University Chittagong
Department of Computer Science and Engineering
B. Sc. in CSE Mid Term Examination, Spring 2024

Course Code: CSE 2425
Course Title: Theory of Computing

Total marks: 30 *Time: 1 hour 30 minutes*

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

1.

a) Define Theory of Computation and what is the application of theory of computation? Define the following terms with example: **3 CO1 U**

i) String
ii) Language
iii) Alphabet

b) Construct DFA's for the following languages.Consider the the alphabet $\Sigma=\{0,1\}$ **4 CO2 C**

i) {w|w starts and ends with different symbol}
ii) {w|w has odd number of 1's and '10' as a substring}
iii) {w|w does not contain '0101'}

c) Why do we minimize the DFA? Minimize the following DFA: **3 CO1 Ap**

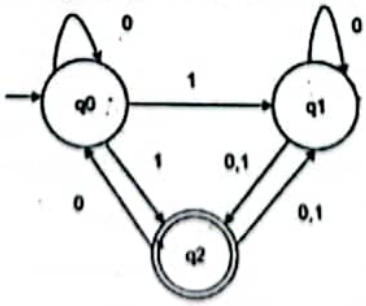
	0	1
→A	B	C
B	B	D
C	B	C
D	B	E
*E	B	C

2.

a) Describe the formal definition of NFA with example. Construct NFA's that for the following language where $\Sigma = \{0,1\}$: **4 CO2 C**

i) L1={set of all strings that end with '010' }and have '011' somewhere preceding}
ii) L2={set of all strings that end with '111' }
iii) L3={set of all strings contain '0' }
iv) L4={set of all strings starting with '00' or '11'}

b) Convert following NFA to equivalent DFA: **3 CO2 Ap**



Or

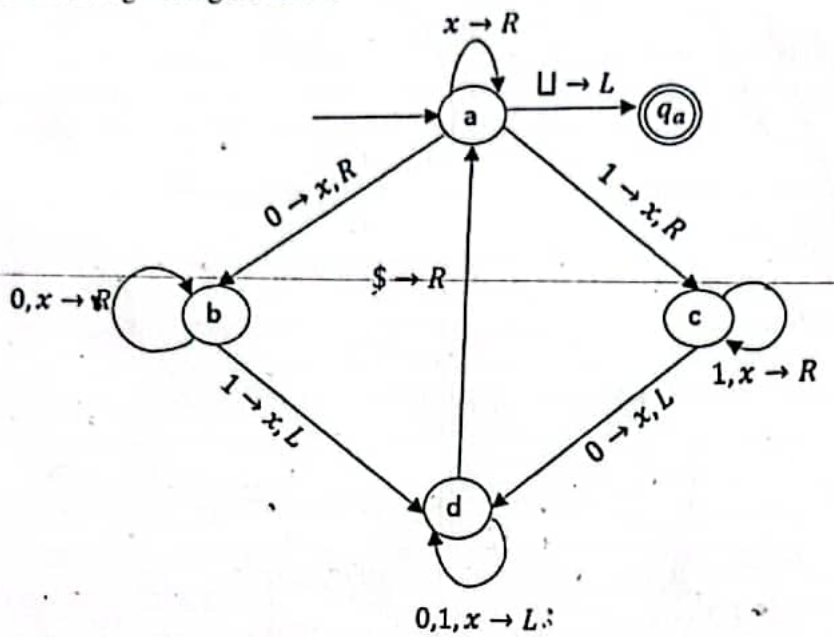
3.c) Convert any one of the following CFGs to an equivalent pushdown automaton — 4 CO3 Ap

$$S \rightarrow TT|U$$
$$T \rightarrow 0T|T0|\#$$
$$U \rightarrow 0U00|\#$$

Or,

$$S \rightarrow aXbY$$
$$X \rightarrow aYa \mid \epsilon$$
$$Y \rightarrow bXb \mid c \mid \epsilon.$$

4.a. Consider the following Turing Machine. — 4 CO3 U



Give the **sequence of configurations** that the machine enters when started with the following strings.
i. 0100
ii. 011010

4.b. Give the **implementation-level description** of Turing Machine that decides the following languages (*any two*) — 2 * 3 = 6 CO3 An
i. L = {w | w does not contain twice as many 0s as 1s}
ii. L = $\{ww^R \mid$ w is any string of 0's and 1's$\}$
iii. L = $\{a^n b^m c^n d^m | n \geq 1, m \geq 1\}$

5.a. What is the Church-Turing Thesis?
Define *decidability* and *undecidability* in the context of *theory of computing.* — 4 CO4 Ap

5.b. Prove that the **Halting Problem** for Turing Machine is undecidable. — 3 CO5 Ap

Or,

Consider the language A_{DFA} = {(B , w) | B is a DFA that accepts input string w}.
Prove that, "***A_{DFA} is a decidable language***".

5.c. Define the complexity classes P, NP, NP-hard and NP-complete. How can you show that a problem is NP-complete? — 3 CO6 U

OR

What is **reducibility**? What do you understand by **polynomial time complexity** and **exponential time complexity**? Explain with an example.