



## International Islamic University Chittagong

### Morality Development Program

Semester End Examination

Semester: Spring -2023

Course Title: Concepts of Moral Development-I

Course Code: MDP-2404

[Other than Shariah Faculty]

Full Marks: 50

Time: 2.5 Hours

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*[N.B: Answer any five (05) from the following questions]*

1. Deduce the meaning of al-ma'roof and al-munkar. Explain the significances of enjoining good and forbidding evil. 10
2. What is good health? Illustrate the health guidelines from Quran and Sunnah. 10
3. What is the definition of gambling? Draw various events of gambling which are established in our state and society. State along with their adverse effects in our life. 10
4. "The prohibition of gambling is a must in the light of Islamic spirit." - Explain the statement. 10
5. What do you understand by coexistence of different religions in society? Cite the situation in the light of the tolerance of the Prophet Muhammad Sallallahu alaihi wasallam towards other religions. 10
6. Define Brotherhood in Islam. How the Prophet Muhammad Sallallahu alaihi wasallam instilled Brotherhood among Muslims? 10
7. How are the elderly treated in Islam? Do they have a special status? Do they receive care that suits their health needs? Explain the statement "Rights due to parents, no old age home in Islam!" 10

**International Islamic University Chittagong**  
 Center for General Education (CGED)  
**Semester End Examination Spring Semester- 2023**  
 Course Code: GEBL-2401  
 Course Title: Bangla Language and Literature  
 Full Marks: 50 Time: 2.5 Hours

**ক-বিভাগ**

ভাষা ও নিমিত্তি: ৩০

(প্রতিটি প্রশ্নের মান সমান।)

প্রশ্ন নং	বর্ণনা	মান	CLO	Cognitive learning
০১.	নিচের শব্দগুলো থেকে ভুল-শুল্দ নির্ণয় করে সঠিক বানানসহ লেখ: কিংবদন্তি, কার্যালয়, প্রাণিসম্পদ, আকাংখা, দুঃখ, লাইব্রেরী, স্টেসন, রবি বার, করব না, পড়ি নি।	১০	CLO1	Apply
০২.	‘আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয়ের প্রধান গেইটে ফুটওভার ব্রিজ চাই’- শীর্ষক পত্রিকায় প্রকাশের উপযোগী একটি চিঠি রচনা কর। অথবা, একটি স্বরচিত ক্ষুদ্র গল্প লেখ।	১০	CLO1	Create
০৩.	সংক্ষিপ্ত আলোচনা কর: ক. বাংলা লোকসংকুতি। খ. মানবতা ও নৈতিকতা।	৫×২=১০	CLO3	Create

**খ-বিভাগ**

সাহিত্য: ২০

প্রশ্ন নং	বর্ণনা	মান	CLO	Cognitive learning
০১.	“তোমাকে পাওয়ার জন্যে হে স্বাধীনতা” কবিতাটি বাংলাদেশের সর্বাত্মক মুক্তিযুদ্ধের একটি কাব্যিক দলিল- কবিতার আলোকে বক্তব্যটির সত্যতা নিরূপণ কর।	১০	CLO3	Apply
০২.	“সভ্যতার সংকট” প্রবন্ধের প্রতিপাদ্য বিষয় আলোচনা কর। অথবা, মুনীর চৌধুরীর “কৰৱ” নাটকের নেতা ও মুর্দা ফকির চরিত্র বিশ্লেষণ কর।	১০	CLO3	Analyze

International Islamic University Chittagong  
 Department of Computer Science and Engineering  
 B. Sc. in Computer Science and Engineering  
 Semester Final Exam, Spring 2023

Course Code: ACC 2401

Time: 2 hours 30 minutes

Course Title: Financial & Managerial Accounting

Full Marks: 50

(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), 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

**Group A**

[Answer the questions from the followings]

[1]

**Amin Electronics Company**  
 Adjusted Trial Balance  
 as at 31 December 2021

CO2 C2 10

	Dr(£)	Cr(£)
Cash	19130	
Accounts receivable	5440	
Supplies	1520	
Insurance Prepayment	4600	
Land	20000	
Office equipment	3600	
Accounts payable		1800
Unearned interest revenue		480
Notes payable		15000
Capital		30000
Drawings	8000	
Interest revenue		33680
Salary expense	9050	
Rental expense	3200	
Utility expense	1970	
Supplies expense	4080	
Sundry expense	910	
Insurance expense	200	
Rental revenue		240
Salary payable		500
Total	81,700	81,700

Required: Financial statements of Amin Electronics Company for the year ended 31 December 2021.

OR

Page 1 of 4

[1]

**Arafat and Sons**  
Trial balance  
December 31, 2022

CO2 C4

Particular	Dr (Tk.)	Cr (Tk.)
Cash	6000	
Accounts receivable	5000	
Supplies	1000	
Furniture	10000	
Accumulated depreciation- Furniture		4000
Building	50000	
Accumulated depreciation- Building		30000
Account payable		2000
Unearned Service revenue		8000
Salary payable		
Common Stock		10000
Retained Earnings		2000
Drawings	25000	
Service revenue		60000
Salary expense	16000	
Supplies expense		
Advertising Expense	3000	
Depreciation expense- Furniture		
Depreciation expense- Building		
Total	116000	116000

Following additional data as follows :

**Adjustment data:**

- (i) Supplies on hand at year end, Tk. 200.
- (ii) Depreciation on furniture , Tk. 2000
- (iii) Depreciation on building , Tk. 1000.
- (iv) Salaries owed but not yet paid, Tk. 5000
- (v) Accrued service revenue , Tk. 1300.
- (vi) Tk. 3000 of the unearned service revenue has been earned.

**Required:**

- 1) Prepare adjusting journal entries for given adjustment data.
- 2) Prepare the adjusted trial balance at December 31, 2022 the end of the company's fiscal year.

[2]

**Agape Counseling Center**  
Trial Balance  
May 31, 2018

CO2 C2 10

Sl. No.	Name of Accounts	Debit	Credit
	Cash	Tk.1,670	-
	Notes Receivable	10,340	-
	Supplies	560	-
	Prepaid Insurance	1,790	-
	Furniture	27,410	-
	Accumulated Depreciation- Furniture	-	Tk.1,480

Building	55,900	-
Accumulated Depreciation-Building	-	33,560
Land	13,700	-
Accounts Payable	-	14,730
Unearned service revenue	-	6,800
N/P-Long Term	-	18,700
R. J. Capital	-	34,290
R. J. Withdrawal	3,800	-
Service revenue	-	9,970
Salary expense	2,170	-
Utilities expense	490	-
Property Tax expense	640	-
Advertisement expense	1,060	-
<b>Total</b>	<b>1,19,530</b>	<b>1,19,530</b>

Additional data at May 31, 2018:

- a) Accrued salary expense Tk.600.
- b) Supplies on hand Tk.410.
- c) Prepaid insurance expired during May Tk.390
- d) Unearned service revenue earned during May Tk.4,400.
- e) Accrued interest revenue Tk.170.
- f) Depreciation: Furniture Tk.380; Building Tk.160.

**Required: Complete a ten-column worksheet for May.**

### Group B

[Answer the questions from the following]

[3]

The following cost and inventory data for the just completed year 2022 are **CO2 C3 10** taken from the accounting records of ALOM MOTORS:

Particular	\$
Sales commission	35,000
Utilities, factory	9,000
Maintenance, factory	24,000
Supplies, factory	700
Advertising expense	Student ID
Direct labor	90,000
Purchase of raw materials	1,32,000
Rent, factory building	80,000
Indirect labor	56,300
Depreciation - Office	8,000
Depreciation - factory	40,000
Inventories:	December 31,
Finished goods	7,000
Materials	8,000
Work in process	5,000
	December 31,
	25,000
	10,000
	20,000

**Required:** Prepare Cost of goods sold statement for the year 2022.

- [4] ABC Door Company sells doors to home builders. The doors are sold for \$50 each. Variable costs are \$32 per door and fixed costs total \$108,000 per year. The company is currently selling 15000 doors per year.

CO3 C3

**Required:**

- i. Compute BEP in sales unit and sales amount.
- ii. How many units would have to be sold to earn a minimum net operating income of \$50000?
- iii. Prepare a contribution format income statement and compute DOL.
- iv. Management is confident that the company can increase sales by 40% next year. Compute the expected percentage increase in net operating income for next year and also expected total amount of net operating income for the next year. (Do not prepare an income statement, use degree of operating leverage).

- [5] The production department of Zan Corporation has submitted the following forecast of units to be produced by quarter for the upcoming fiscal year:

Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th
Units to be produced	5,000	8,000	7,000	6,000

In addition, the beginning raw materials inventory for the 1st Quarter is budgeted to be 7,000 grams and the beginning accounts payable for the 1st Quarter is budgeted to be \$2,500. Each unit requires 8 grams of raw material that costs \$1.50 per gram. Management desires to end each quarter with an inventory of raw materials equal to 35% of the following quarter's production needs. The desired ending inventory for the 4th Quarter is 8,000 grams. Management plans to pay for 70% of raw material purchases in the quarter acquired and 30% in the following quarter.

**Required:**

Prepare the company's direct materials budget and schedule of expected cash disbursements for purchases of materials for the upcoming fiscal year.

OR

- [5] Peak sales for Midwest Products, Inc. occur in August. The company's sales budget for the third quarter showing these peak sales is given below:

CO3 C5 10

	July	August	September	Total
Budgeted sales	\$600,000	\$900,000	\$500,000	\$2,000,000

From past experience, The company has learned that 20% of a month's sales are collected in the month of sale, that another 70% is collected in the month of following sale, and that the remaining 10% is collected in the second month following sale. Bad debts are negligible and can be ignored. May sales totaled \$430,000, and June sales totaled \$540,000.

**Required:**

- a. Prepare a schedule of expected cash collections from sales, by month and in total, for the third quarter.
- b. Assume that the company will prepare a budgeted balance sheet as of September 30. Compute the accounts receivable as of that date.

# International Islamic University Chittagong

## Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Spring 2023

Course Code: CSE 2421 Course Title: Computer Algorithms

Total marks: 50 Time: 2 hours 30 minutes

[The figures in the right hand margin indicate full marks. Course Outcomes and Bloom's Taxonomy Levels are mentioned in additional columns]

### Group A

- 1.a Explain with example what a greedy choice is.

CO5 E 3

OR

Prove that activity selection problem has greedy choice property.

- b. Suppose you have to pay X taka in a shop using minimum number of notes. You have 20, 10, 5, 2, 1 taka notes with you. Write a greedy algorithm to do this.

CO5 C 3

- c. Determine an optimal Huffman code for the following set of frequencies:

CO1 A 4

a:M, b:3, c:18, d:12, e:N, f:6, g:21, h:42

(Note: M is the sum of last two digits of your ID and N is the last two digits of your ID.

i.e. if your ID is C151216, then M=1+6=7, and N=16).

- 2.a Analyze the running time of Prim's algorithm if the priority queue is represented by a binary heap.

CO1 N 3

OR

Analyze the running time of Dijkstra's single-source shortest algorithm if the priority queue is represented by a binary heap.

- b) Write down the code segment for finding following information from a given unweighted directed graph with V vertices which is already implemented using an adjacency matrix named *graph*.

CO2 A 3

i) Find the in-degree of each vertex.

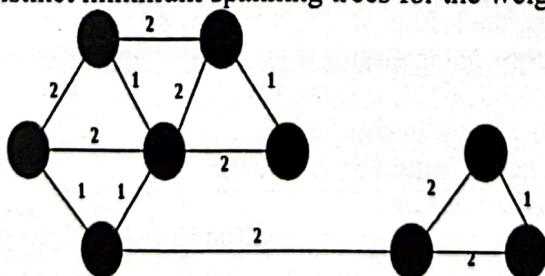
ii) Find whether there is any loop in the graph.

- c) Consider a complete undirected graph with vertex set {0, 1, 2, 3, 4}. Entry  $W_{ij}$  in the matrix W below is the weight of the edge  $\{i, j\}$ . What is the minimum possible weight of a spanning tree T in this graph such that vertex 0 is a leaf node in the tree T?

0	1	8	1	4
1	0	12	4	9
8	12	0	7	3
1	4	7	0	2
4	9	3	2	0

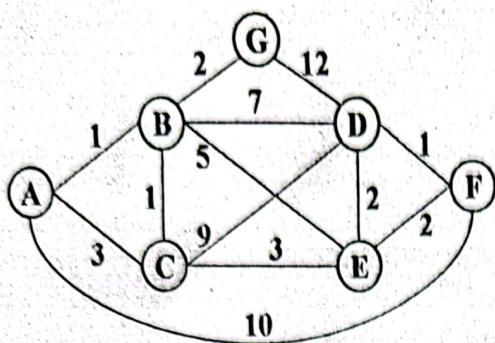
OR (for 2c)

Find the number of distinct minimum spanning trees for the weighted graph below.



## Group B

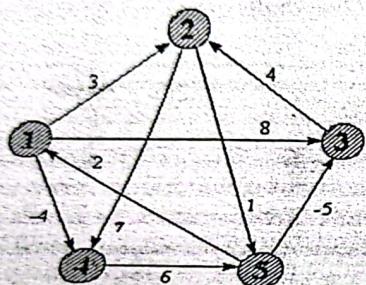
- 3.a Run the Dijkstra's algorithm to find single source shortest path on the weighted directed graph CO1 A of the following figure using vertex **G** as the source.



**OR**

Run the Bellman-Ford's algorithm to find single source shortest path on the weighted directed graph of the above figure using vertex **G** as the source.

- b. Consider the following graph for finding all pair shortest path using Floyd-Warshall CO1 A 5 algorithm.



$D(3) =$

0	3	8	7	-4
inf	0	inf	1	7
inf	4	0	5	11
2	-1	-5	0	-2
inf	inf	inf	6	0

What is the value of matrix  $D(4)$  calculated from matrix  $D(3)$  given above.

**OR**

Find the transitive closure of the directed graph given above using Warshall's algorithm. Show the matrix  $T^{(k)}$  that results for each iteration of the outermost loop.

- 4.a Suppose that an ant is traveling from point A(5,3) to point B(17,9) in straight line, and from there it started to travel towards point C(2,6). Did the ant turn to left or right at point B? From point C it travelled towards point D(5,12). What turn did the ant make at point C, left or right? Show using the technique of cross-product. CO1 C 5

- b. i) Plot the following points on a Cartesian coordinate plane. An approximate drawing is sufficient. CO1 A 5  
 $[(4,3), (8,4), (10,5), (6,7), (2,8), (5,8), (2,2), (6,5), (1,8), (3,3), (12,3), (0,2)]$   
 ii) Sort the above points according to polar angle with respect to the point which is the lowermost and in case of a tie the leftmost.  
 iii) Find the convex hull of these points using Graham's Scan algorithm.

- 5.a Explain why NP-complete class is important in complexity theory. CO4 U 2  
 b. What is the basic principle of reducing the solution / state / search space in branch and bound technique? If required use a suitable example. CO5 A 4  
 c. In chess, a Rook attacks any opponent piece if it is placed in the same row or same column. Let N-Rook is a problem of placing N Rooks in an  $N \times N$  chessboard such that no two Rooks attack each other. Show, using a tree, how a backtracking algorithm searches the state space while solving 4-Rook problem. CO2 A 4

# International Islamic University Chittagong

## Department of Computer Science and Engineering

B. Sc. in CSE Final Examination, Spring 2023

Course Code: CSE 2423 Course Title: Database Management System

Total marks: 50

Time: 2 hours 30 minutes

[Answer all the question; Figures in the right hand margin indicate full marks]

- 1 (a). Consider the following database schema and answer the questions. 6 CO CO2 DL C3

Employee(E\_id, C\_id, E\_Name, Email, Phone\_no, Salary, Address, F\_id)

Customer(C\_ID, C\_Name, Email, Phone\_no, F\_id)

Food\_Item(F\_ID, C\_ID, F\_Name, Price, Quantity)

- 1) Write the sql statement required to create these relations, you have to include all integrity constraints.
- 2) Define constraints on food item table as such quantity should be at least one item.
- 3) Define constraints on Employee such that a minimum 15000 BDT pay scale is followed by the organization.

- 1 (b). i) Define referential integrity constraints and domain constraints with example. 4 CO2 C3

ii) Describe the following:

- a) Encryption and Decryption
- b) Privileges..

- 2 (a). Consider the relation schema R = (A, B, C, D, and E) having following set F of functional dependencies: 8 CO2 C3

$A \rightarrow BC$

$CD \rightarrow E$

$B \rightarrow D$

$E \rightarrow A$

Requirements:

1. Suppose that we decompose the relation schema (A, B, C) and (A, D, E). How that this decomposition is a lossless decomposition if the above functional dependencies holds?
2. Give an example of a relation schema R and a set of dependencies such that R is in BCNF but is not in 4NF.
3. Compute the closure and list the candidate keys for R considering above functional dependencies.

OR

Briefly answer the following questions:

- a) Give a set of FDs for the relation schema  $R(A, B, C, D)$  with primary key  $AB$  under which  $R$  is in 1NF but not in 2NF.
- b) Give a set of FDs for the relation schema  $R(A, B, C, D)$  with primary key  $AB$  under which  $R$  is in 2NF but not in 3NF.
- c) Consider the relation schema  $R(A, B, C)$ , which has the FD  $B \rightarrow C$ . If  $A$  is a candidate key for  $R$ , is it possible for  $R$  to be in BCNF? If so, under what conditions? If not, explain why not.

2 (b). What do you understand by functional dependency? Write down and explain the types of functional dependency.

2 CO

OR

What do you mean by Normalization? Why normalization is important?

### GROUP-B

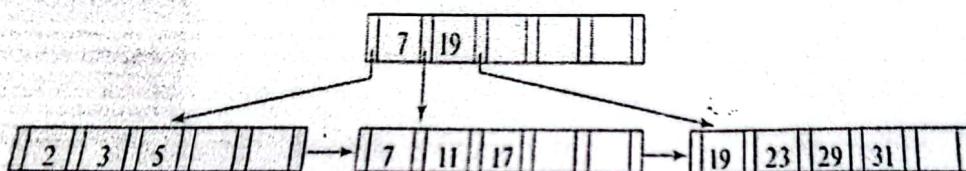
3 (a). 1) Explain the distinction between closed and open hashing. Discuss the relative merits of each technique in database applications. 6 CO2 C2

2) What are the causes of bucket overflow in a hash file organization? What can be done to reduce the occurrence of bucket overflows?

3) Why is a hash structure not the best choice for a search key on which range queries are likely?

3(b). Consider following B+ tree and perform following operations step-by-step in it 4 CO2 C3

- |              |             |              |              |               |
|--------------|-------------|--------------|--------------|---------------|
| 1. Insert 8  | 2. Insert 4 | 3. Insert 13 | 4. Insert 20 | 5. Insert 22  |
| 6. Insert 35 | 7. Delete 3 | 8. Delete 20 | 9. Delete 19 | 10. Delete 29 |



4. Answer the following questions:

10 CO1 C2

1. Describe how a typical lock manager is implemented. Why must lock and unlock be atomic operations?

2. Contrast the timestamps assigned to restarted transactions when timestamps are used for deadlock prevention versus when timestamps are used for concurrency control.

3. Show that, if two schedules are conflict equivalent, then they are view equivalent.

4. Give an example of a serializable schedule that is not strict.

OR

Answer the following questions:

1. Show that the two-phase locking protocol ensures conflict serializability and that transactions can be serialized according to their lock points.

2. What benefits does rigorous two-phase locking protocol provide? How does it compare with other forms of two-phase locking?

3. Show by example that there are schedules possible under the tree protocols that are not possible under the two-phase locking protocol, and vice versa.

4. Why should transactions need to assure ACID properties?

5(a). What is B+ tree? Compare between primary and secondary indices.

3 CO1 C2

5(b). When does multilevel indexing preferable? Justify your answer with example.

3 CO1 C2

5 (c). Construct B+ tree for the following set of key values.

4 CO1 C2

1,6,8,12,15,19,14,18,32,40,51,46,60,55,62

Assume that the tree is initially empty and Node Size:4

\*\* THE END\*\*

**International Islamic University Chittagong**  
**Department of Computer Science and Engineering**

*B. Sc. in CSE Final Examination, Autumn 2022*

**Course Code: CSE-2425 Theory of Computing**

**Total marks: 50**

**Time: 2 hours 30 minutes**

[Figures in the right-hand margin indicate full marks]

Course Outcomes and Bloom's taxonomy levels are mentioned in additional columns

Bloom's Taxonomy Levels (Cognitive Domain)						
Letter Symbols	R	U	A	N	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

**Group-A**

**CO DL**

**1.**

- a) Describe the components of context-free grammar. Is any of the components have a similarity with any of the components of regular language or finite automata? **CO1 U 3**

OR

Define and differentiate between the following.

- a. Derivation and Parse Tree
- b. Leftmost and Rightmost derivation

- b) What is ambiguity? Determine whether the following grammar is ambiguous. **CO2 N 3**

$$S \rightarrow AB$$

$$A \rightarrow aA \mid abA \mid \epsilon$$

$$B \rightarrow bB \mid abB \mid \epsilon$$

- c) Consider the following grammar

$$S \rightarrow SSx \mid SSy \mid SSz \mid a \mid b \mid c$$

Show how to derive the string **cabxycz** using this grammar using a left-most derivation. Draw the parse tree for the string.

OR

Show how to derive the string **cabxycz** using this grammar using a right-most derivation. Draw the parse tree for the string.

**2.**

- a) Show using the pumping lemma which of the following languages are context-free. **CO2 N 3**

- i.  $L1 = \{w \mid w \in a^n b^n c^{2n} \mid n \geq 0\}$
- ii.  $L2 = \{w \mid w \in a^n b^n c^n \mid n \geq 0\}$

OR

Describe the following languages using a context-free grammar.

- a.  $0^* 1^*$
- b.  $1(01)^*$
- c.  $(11 \cup 0)^*$

- b) Give a context-free grammar (CFG) for each of the following languages over the alphabet  $\Sigma = \{a, b\}$ : **CO2 C 4**

- i.  $L = \{a^{2n} b^m c^n \mid n \geq 0\}$
- ii.  $L = \{a^m b^n c^{m+n} \mid n \geq 0\}$

- c) Convert the following CFG into an equivalent CFG in Chomsky normal form. **CO2 N 3**

$$R \rightarrow aSa \mid bRb \mid S$$

$$S \rightarrow aTb \mid bTa \mid aS$$

$$T \rightarrow XTX \mid X \mid \epsilon$$

$$X \rightarrow a \mid b$$

## Group-B

- 3.**
- a) How  $\epsilon$ -rules are removed when converting a grammar to Chomsky normal form? CO2 U 2  
OR  
Why do you think pushdown automata are more powerful than finite automata?
  - b) Construct a pushdown automaton that recognizes the following language CO3 C 4  

$$L = \{a^{2n}b^nc^n \mid n \geq 0\}$$
OR  
Construct a pushdown automaton that recognizes any arithmetic expression involving +, \*, and any one-digit integer.
  - c) Convert any one of the following context-free grammar (CFG) to an equivalent pushdown automaton CO3 N 4
 

$S \rightarrow XYm / XYn$   
 $X \rightarrow aX / \epsilon$   
 $Y \rightarrow bY / \epsilon$

OR

$S \rightarrow aXbY$   
 $X \rightarrow aYa / \epsilon$   
 $Y \rightarrow bXb / c / \epsilon$

**4.**

- a) What is the Church-Turing thesis? CO4 U 2
- b) Can you run a nondeterministic algorithm on a deterministic machine instead of a nondeterministic one? If your answer is yes, then explain how you can do it and how the running time will be affected. If your answer is no, then explain why it will not be possible. CO5 E 4
- c) Give the implementation-level description of a Turing machine that decides the following languages:  $L = \{a^{2n}b^nc^n \mid n \geq 0\}$ . CO3 A 4

**5.**

- a) Let the language  $A_{DFA} = \{(B, w) \mid B \text{ is a DFA that accepts input string } w\}$ . Prove CO4 E 3 that " $A_{DFA}$  is a decidable language."
- b) Show that the set of infinitely long binary sequences is uncountable. CO4 N 3
- c) What are N Let,  
 $A_{TM} = \{\langle M, w \rangle \mid M \text{ is a TM and } M \text{ accepts } w\}$   
 and  
 $\text{HALT}_{TM} = \{\langle M, w \rangle \mid M \text{ is a TM and } M \text{ halts on input } w\}$   
 Prove that if  $A_{TM}$  is undecidable then  $\text{HALT}_{TM}$  is also undecidable.

International Islamic University Chittagong (IIUC)  
 Department of Computer Science and Engineering (CSE)  
 B. Sc. in CSE; Semester Final Examination; Spring-2023

Course Code: MATH-2407

Course Title: Mathematics-IV

Time: 2:30 hours

Total Marks: 50

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

**Group A**

1. Define Fourier series in the interval  $(-L, L)$ . Sketch the following function for 10 CO3 U four cycles, also find the Fourier series for the function.

$$y = f(t) = \begin{cases} 0 & ; -3 \leq t < 0 \\ 3 & ; 0 \leq t < 3 \end{cases}$$

- Or Derive the complex form of the Fourier series. 10 CO3 U

- 2.a Find Harmonic analysis of the given Fourier series 5 CO4 An

$$f(t) = \frac{4}{\pi} \sum_{n=1}^{\infty} \frac{(-1)^{n+2}}{n} \sin \frac{n\pi t}{6}$$

- 2.b Find the Convolution Sum  $x[n] * h[n]$  for the following functions 5 CO4 An

$$\begin{aligned} x[n] &= 3 & n = 0 & h[n] = 1 & n = 0 \\ &= 1 & n = 1 & & = 3 & n = 1 \end{aligned}$$

Where n is the time index

**Group B**

- 3.a Solve the following Initial Value Problem (IVP) by Laplace Transform: 5 CO3 Ap

$$Y'' + Y = t, \quad Y(0) = 1 \quad Y'(0) = 2$$

- Or Find Laplace Transform  $t^2 \sin 2t$  using the Multiplication theorem. 5 CO3 Ap

- 3.b Sketch the waveforms for the following signals 5 CO1 Ap

$$x(t) = -u(t+3) + 2u(t+1) - 2u(t-1) + u(t-3)$$

- Or  $x(t) = r(t+2) - r(t+1) - r(t-1) + r(t-2)$  5 CO1 Ap

- 4.a State first shift theorem. Using the theorem evaluate  $\mathcal{L}\{e^{-4t}t^2\}$  5 CO1 U

- 4.b Define unit step function. Sketch the following function, 5 CO1 U

$$x(t) = -u(t+3) + 2u(t+1) - 2u(t-1) + u(t-3)$$

- 5.a Write MATLAB code to sketch line spectrum (at least 6) for the following 4 CO5 Ap

Fourier series 
$$\underbrace{f(t)}_{\text{Complex wave}} = \underbrace{2}_{\text{DC value}} + \underbrace{\left[ \sum_{n=1}^{\infty} (\cos 2n\pi + 1) \sin \frac{n\pi t}{6} \right]}_{\text{AC value}}$$

- 5.b Make a function in MATLAB environment to raise a complex wave  $f(t)$  in the 6 CO5 Ap time interval of  $[-4, 20]$  for the following Fourier series:

$$f(t) = 4\pi + \sum_{n=1}^{\infty} \frac{4}{n\pi} \cos 2n\pi t$$