

# NMAM INSTITUTE OF TECHNOLOGY, NITTE

Off-Campus Centre of Nitte (Deemed to be University)

## II Sem B.Tech (CBCS) Mid Semester Examinations - I, February 2025

### MA1007-1 – DISCRETE MATHEMATICS AND TRANSFORM TECHNIQUES

(For AD, AM, CB, CC, CS, IS, RI)

Duration: 1 Hour

Max. Marks: 20

#### Part – A: Multiple Choice Questions (1\*4 = 4 marks)

Note: Answer all **Four** questions in the **Answer Book**. Each question carries equal marks.

1. Which rule of inference is used in this argument "If it hails today, then the local office will be closed. The local office is not closed today. Thus, it did not hail today".  
 A) Simplification  
 B) Modus tollens  
 C) Hypothetical Syllogism  
 D) Conjunction
2. Which of the following statement is logically equivalent to the statement  $(\neg p \vee q)$   
 A)  $(p \wedge q)$   
 B)  $(p \rightarrow q)$   
 C)  $(\neg p \wedge q)$   
 D)  $(p \vee \neg q)$
3. Which of the following statements is not correct?  
 A) A reflexive relation has a cycle of length one at every vertex.  
 B) The matrix of reflexive relation must have all 1's in its main diagonal.  
 C) If  $R$  is a reflexive relation on  $A$ , then  $\text{Domain}(R) = \text{Range}(R) = A$ .  
 D) The matrix of reflexive relation must have all 0's in its main diagonal.
4. If  $p = (2, 3, 4, 7)$  is a permutation of the set  $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$  then  $p^{-1} =$   
 A)  $(4, 7, 2, 3)$   
 B)  $(7, 4, 2, 3)$   
 C)  $(7, 4, 3, 2)$   
 D)  $(3, 4, 7, 2)$

#### Part – B: Descriptive Answer Questions (2\*8 = 16 marks)

Note: Answer any **One** full question from **each Unit**.

##### Unit – I

- |   | Marks | BT* | CO* | PO* |
|---|-------|-----|-----|-----|
| 1. a) Show that the premises "It's not hot this afternoon and it is colder than yesterday", "if we go swimming, then it is hot", "we do not go swimming only if we have a boating trip", "If we have a boating trip, then we reach home early" lead to the conclusion "we will reach home early". | 4     | L*2 | 1   | 2   |
| b) For all $n \geq 1$ , prove that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$   | 4     | L3  | 1   | 2   |
| 2. a) Write a truth table for the statement $(p \rightarrow q) \leftrightarrow (\neg q \rightarrow \neg p)$ and Interpret whether the statement is a Tautology, Contingency or contradiction.   | 4     | L1  | 1   | 2   |
| b) Prove that $\sqrt{2}$ is irrational.   | 4     | L2  | 1   | 2   |

##### Unit – II

- |   |   |    |   |   |
|---|---|----|---|---|
| 3. a) Let $A = \{1, 2, 3, 4, 5, 6\}$ , $R$ is the relation on $A$ defined by $aRb$ iff $a$ is a multiple of $b$ .<br>(a) Find a relation $R$<br>(b) Give the matrix representation of $R$<br>(c) Draw the digraph of $R$ .  | 4 | L2 | 2 | 2 |
| b) (i) Let $A = \mathbb{Z}$ . Determine whether the relation $R$ on the set $A$ , such that $aRb$ iff $a \leq b + 1$ , is reflexive, symmetric, or transitive.<br>(ii) Define the degree of vertex of an undirected graph with an example.  | 4 | L1 | 2 | 2 |
| 4. a) Let $A = \{1, 2, 3, 4\}$ . Find the matrix of the transitive closure by Warshall's algorithm. Given $M_R = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$  | 4 | L3 | 2 | 2 |
| b) Let $P = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 4 & 6 & 5 & 2 & 1 & 8 & 7 \end{pmatrix}$ be a permutation of $A = \{1, 2, 3, 4, 5, 6, 7, 8\}$ .<br>(i) Write $P^{-1}$ .<br>(ii) Express the permutation $P$ as a product of transposition. Also, determine whether $P$ is odd or even. | 4 | L2 | 2 | 2 |

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome

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**Off-Campus Centre of Nitte (Deemed to be University)**  
**II Sem B. Tech (CBCS) Mid Semester Examinations -I, February 2025**

**CY1003-1 – MATERIALS CHEMISTRY FOR COMPUTER SYSTEMS**

(For AD, AM, CB, CC, CS, IS, RI)

Duration: 1 Hour

Max. Marks: 20

**Part – A: Multiple Choice Questions** (1\*4 = 4 marks)

*Note: Answer all **Four** questions in the **Answer Book**. Each question carries equal marks.*

1. Special properties of 'Li' metal that make it advantageous as an electrode material include .....  
 A) High electrode potential  
 B) Low cost  
 C) Light weight  
 D) Low electrical conductivity
2. Which of the following is an example for working concentration cell?  
 A)  $\text{Fe}|\text{FeSO}_4(0.10\text{M})||\text{CuSO}_4(0.10\text{M})|\text{Cu}$   
 B)  $\text{Mg}|\text{Mg}^{2+}(\text{aq})||\text{Cd}^{2+}(\text{aq})|\text{Cd}$   
 C)  $\text{Ag}|\text{AgNO}_3(0.10\text{M})||\text{AgNO}_3(0.50\text{M})|\text{Ag}$   
 D)  $\text{Fe}|\text{Fe}^{2+}(0.015\text{M})||\text{Ag}^+(0.13\text{M})|\text{Ag}$
3. Vinyl compounds are .....  
 A) Bifunctional monomers  
 B) Trifunctional monomers  
 C) Polymers  
 D) Not example for monomers
4. Compared to chemical analysis, instrumental analysis requires .....  
 A) Very large amount of analyte  
 B) Very small amount of analyte  
 C) No analyte  
 D) No calibration of instruments

**Part – B: Descriptive Answer Questions** (2\*8 = 16 marks)

*Note: Answer any **One** full question from **each Unit**.*

Unit – I		Marks	BT*	CO*	PO*
1. a)	Define reference electrode. Explain the construction and working of calomel electrode.	3	L*2	1	1
b)	For the cell $\text{Ni} \text{NiCl}_2(0.05\text{M})  \text{NiCl}_2(0.50\text{M}) \text{Ni}$ , write the net cell reaction and calculate the EMF at 298 K.	2	L3	1	1
c)	Describe the construction and working of Li-ion battery.	3	L2	1	1
2. a)	Define ion selective electrode. How to determine the pH of unknown solution using a glass electrode?	4	L2	1	1
b)	Explain the construction, working and applications of methanol-oxygen fuel cell.	4	L2	1	1
Unit – II					
3. a)	Define polymer. A polymer has the following compositions, 100 molecules of molecular mass 1000g/mol, 200 molecules of molecular mass 2000g/mol and 500 molecules of molecular mass 5000g/mol. Calculate the number and weight average molecular weight.	4	L3	2	1
b)	What are conducting polymers? Explain the mechanism of conduction in polyacetylene with band diagram.	4	L2	2	1
4. a)	Explain the synthesis and applications of carbon fibre.	4	L2	2	1
b)	Define equivalent conductance. Explain the application of conductometry for the estimation of strong acid and weak acid.	4	L2	2	1

BT\* Bloom's Taxonomy, L\* Level; CO\* Course Outcome; PO\* Program Outcome

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NMAM INSTITUTE OF TECHNOLOGY, NITTE  
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CS1005-2 – INTRODUCTION TO PYTHON PROGRAMMING

(For AD, AM, CB, CC, CS, IS, RI)

Duration: 1 Hour

Max. Marks: 20

**Part – A: Multiple Choice Questions (1\*4 = 4 marks)**

Note: Answer all **Four** questions in the **Answer Book**. Each question carries equal marks.

- Which of the following is invalid variable?  
A) `_a = 1`  
B) `_a123 = 1`  
C) `__str__ = 1`  
D) `str# = 1`
- What does the `pass` statement do in Python?  
A) Exits a loop  
B) Acts as a placeholder that does nothing  
C) Skips the rest of the code in a block  
D) Raises an exception
- What will be the output of the following Python code?  

```
y = 6  
z = lambda x : x * y  
print z(8)
```

  
A) 48  
B) 14  
C) 64  
D) 60
- What will be the output of `X&Y` if `x=15` and `y=12`?  
A) `b1101`  
B) `0b1101`  
C) `12`  
D) `1101`

**Part – B: Descriptive Answer Questions (2\*8 = 16 marks)**

**Note: Answer any One full question from each Unit.**

Unit – I		Marks	BT*	CO*	PO*
1. a)	Explain the following operator with programming example i. Membership operator ii. Logical operator	4	L2	1	1
b)	Write a Python program that iterates through integers from 1 to 50. For each multiple of three, print "Fizz" instead of the number; for each multiple of five, print "Buzz". For numbers that are multiples of both three and five, print "Fizz Buzz".	4	L3	1	1
2. a)	Explain looping statements with syntax and programming example	4	L2	1	1
b)	Write a python program to print all prime numbers in an interval.	4	L3	1	1
<b>Unit – II</b>					
3. a)	Explain different types of arguments in python	4	L2	2	1
b)	Write a python program to find the factorial of a number using recursion	4	L2	2	1
4. a)	Compare and Contrast the actual and formal parameters	4	L2	2	1
b)	Explain different ways of importing modules with programming example	4	L2	2	1

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**EC1002-2 – APPLIED DIGITAL LOGIC DESIGN**  
 (For AD, AM, CB, CC, CS, IS, RI)

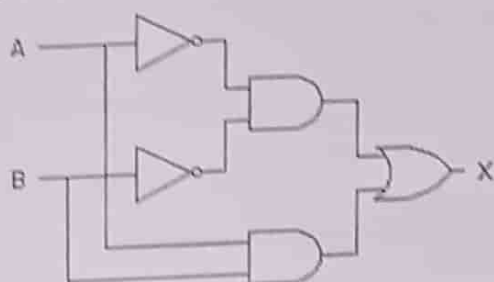
Duration: 1 Hour

Max. Marks: 20

**Part – A: Multiple Choice Questions** (1\*4 = 4 marks)

*Note: Answer all Four questions in the Answer Book. Each question carries equal marks.*

1. Simplify  $Y = AB' + (A' + B)C$   
 A)  $AB + AC$   
 B)  $AB' + C$   
 C)  $A'B + AC'$   
 D)  $AB + A$
2. Express the Boolean function  $F = A + B'C$  as standard sum of minterms.  
 A)  $\Sigma(1, 4, 5, 6, 7)$   
 B)  $\Sigma(1, 2, 4, 6, 8)$   
 C)  $\Sigma(2, 3, 5, 8, 9)$   
 D)  $\Sigma(1, 3, 4, 5, 7)$
3. Which of the following logic expressions represents the logic diagram shown?



- A)  $X = AB' + A'B$   
 B)  $X = (AB)' + AB$   
 C)  $X = (AB)' + A'B'$   
 D)  $X = A'B' + AB$
4. A Karnaugh map will \_\_\_\_\_.  
 A) Eliminate the need for tedious Boolean simplifications  
 B) Allow any circuit to be implemented with just AND and OR gates  
 C) Produce the simplest sum-of-products expression  
 D) Give an overall picture of how the signals flow through the logic circuit

**Part – B: Descriptive Answer Questions** (2\*8 = 16 marks)

*Note: Answer any One full question from each Unit.*

**Unit – I**

	Marks	BT*	CO*	PO*
1. a) Perform the following conversion. (i) $(234.56)_{10} = (?)_2 = (?)_{16}$ (ii) $(11011.011)_2 = (?)_{10} = (?)_{16}$	4	L3	1	1
b) Simplify the following using Boolean Algebra and implement using logic gates. (i) $Y = AB + A\bar{B} + \bar{A}\bar{B}$ (ii) $F = \bar{X}\bar{Y}\bar{Z} + X\bar{Y}Z + \bar{X}YZ + XYZ$	4	L3	1	1
2. a) Convert the following equations into their requested canonical form (i) $X(A, B, C) = \bar{A}B + BC$ (SOP) (ii) $P(W, X, Y) = (\bar{W} + X)(Y + \bar{X})$ (POS)	4 4	L3 L2	1 1	1
b) State and prove De-Morgan's theorem using the tabular method.				

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## Unit – II

3. a) Using K-map and simplify the following functions.
- (i)  $f(a, b, c) = \sum m(0, 1, 2, 3, 7)$
- (ii)  $f(a, b, c, d) = \sum m(0, 1, 3, 7, 8, 9, 11, 15)$
- b) Design a logic circuit that controls the passage of the signal 'A' according to the following requirement
- (i) Output 'X' will equal 'A' when control inputs B and C are the same
- (ii) 'X' will remain 'HIGH' when B and C are different
4. a) Given the simplified expression of Boolean function, write the truth table, minterm list and obtain the given simplified function using K-map method.
- $Y = f(a, b, c) = c'$
- b) A system receives three inputs and generates a one-bit output based on the even number of ones present in the input. If the inputs are completely zeros or if it has an odd number of ones, the output will be zero and if the input has an even number of ones, then the output will be set to one. Write the truth table for such a system and represent the simplified function using the logic diagram.

4 L3 2

4 L3 2

4 L3 2 1

4 L3 2 1

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**II Sem B.Tech (CBCS) Mid Semester Examinations - I, February 2025**  
**EE1001-2 – BASIC ELECTRICAL ENGINEERING**  
 (For CS,IS,AD,CC,AM,CB,RI,)

Duration: 1 Hour

Max. Marks: 20

**PART-A: Multiple Choice Questions (1X4=4Marks)**

Note: Answer all Four questions in the answer book. Each question carries one mark

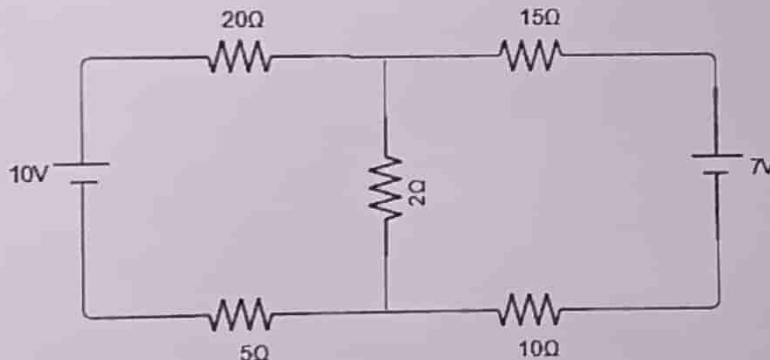
1. Kirchhoff's laws are applicable to
  - A. Passive Networks only
  - B. AC network only
  - C. DC network only
  - D. AC and DC network
2. Inductor doesn't allow the sudden change of
  - A. Current
  - B. Voltage
  - C. Power
  - D. None of the above
3. In a series RC circuit, total voltage is 10V, and voltage across resistor is 6V, then the voltage across the capacitor is
  - A. 4V
  - B. 8V
  - C. 16V
  - D. 10V
4. The minimum number of single-phase wattmeter's needed to measure three phase power are
  - A. 1
  - B. 2
  - C. 3
  - D. 4

**PART-B: Descriptive Answer Questions (2X8=16Marks)**

Note: Answer any one full question from each unit

**Unit – I**

1. a) Apply mesh analysis and find the current in individual resistors shown in fig(i)



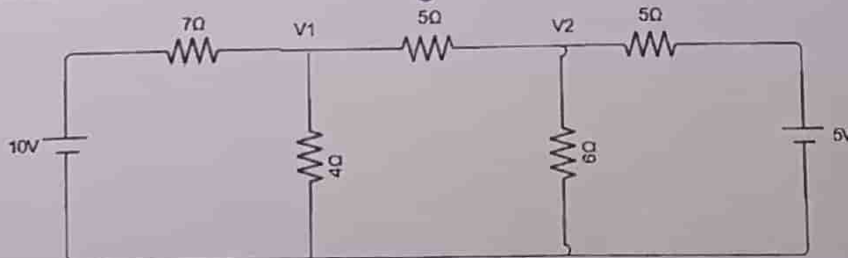
Fig(i)

5	L*3	1	1,2,9, 10
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- b) Define the following with reference to AC
  - i) Time Period
  - ii) Instantaneous value
  - iii) Phase

3	L*1	1	1,2,9, 10
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2. a) Apply node analysis and find the node voltage V1 and V2 and calculate the current through the 5Ω resistor shown in fig (ii).



Fig(ii)

5	L*3	1	1,2,9, 10
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- b) Define and derive the Average value of alternating quantity.

3	L*1	1	1,2,9, 10
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P.T.O

**Unit – II**

3.	a)	Derive the relationship between the current and voltage in a RLC circuit.	5	L*2	2	1,2,9, 10
	b)	A pure inductive coil allows a current of 20 A to flow from 230V, 50Hz supply. Solve for the inductive reactance, inductance of the coil and Power absorbed.	3	L*2	2	1,2,9, 10
4.	a)	Derive the relationship between the line and phase parameters in three phase delta connected circuit.	5	L*2	2	1,2,9, 10
	b)	The input power to a three-phase motor was measured by the two-wattmeter method. The readings were 7.2 kW and 3.7 kW, and the line voltage was 400V. Solve for (a) the total active power (b) the power factor (c) the line current.	3	L*2	2	1,2,9, 10

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