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**R-20**

**Code: 20AC11T**

I B.Tech. I Semester Supplementary Examinations Dec 2023 / Jan 2024

**Algebra and Calculus**  
(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. In Part-A, each question carries **Two marks**.  
 3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

( Compulsory question )

- |  |     |    |
|--|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M )  | CO  | BL |
| a) Define the rank of the Matrix   | CO1 | L1 |
| b) Define index and signature of a Quadratic form  | CO2 | L1 |
| c) Define the rank of the Matrix and signature of a Quadratic form. If $x = r \cos \theta, y = r \sin \theta$ then find $\frac{\partial(x,y)}{\partial(r,\theta)}$ | CO3 | L3 |
| d) Evaluate $\int_0^{\pi/2} \int_0^2 \int_0^2 xy^2z \, dz \, dy \, dx$   | CO4 | L5 |
| e) Define Gamma function   | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks    CO    BL

**UNIT-I**

2. a) Reduce the matrix to Echelon form and find its rank
- $$\begin{bmatrix} -1 & -3 & 3 & -1 \\ 1 & 1 & -1 & 0 \\ 2 & -5 & 2 & -3 \\ -1 & 1 & 0 & 1 \end{bmatrix}$$
- 6M    CO1    L3
- b) Investigate the values of  $\lambda$  and  $\mu$  so that the equations  $2x+3y+5z=9, 7x+3y-2z=\mu$  have (i) no solution, (ii) a unique solution and (iii) an infinite number of solutions.
- 6M    CO1    L3

**OR**

3. Find for what value of  $\lambda$  the system of equations  $x+y+z=1, x+2y+4z=\lambda, x+4y+10z=\lambda^2$  has a solution and solve them completely in each case.
- 12M    CO1    L3

**UNIT-II**

4. State and verify Cayley-Hamilton theorem for the matrix  $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$  and hence find  $A^4$ .
- 12M    CO2    L2

OR

5. If  $A = \begin{bmatrix} 4 & -8 & -2 \\ 1 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$  then find the matrix P (model matrix) which transforms the matrix A to a Diagonal matrix. 12M CO2 L3

**UNIT-III**

6. a) Using Maclaurin's series, expand  $\log(1+x)$  in powers of x. 6M CO3 L3  
 b) Using Maclaurin's series, find the minimum value of  $x^2 + y^2 + z^2$  given  $x + y + z = 3a$ . 6M CO3 L3

OR

7. a) If  $x + y + z = a$ ,  $x + y + z = u$ ,  $y + z = uv$ ,  $z = uvw$ , then evaluate  $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ . 6M CO3 L5  
 b) Find the maximum value of  $x^2 + y^2 + z^2$  under the condition that  $x + y + z = a$ . 6M CO3 L3

**UNIT-IV**

8. Evaluate the integral  $\int_0^{4a} \int_{\frac{x^2}{4a}}^{2\sqrt{ax}} y \, dy \, dx$ . 12M CO4 L5

OR

9. Evaluate  $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} e^{x+y+z} \, dz \, dy \, dx$ . 12M CO4 L5

**UNIT-V**

10. a) Show that  $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$ . 6M CO5 L2  
 b) Evaluate  $\int_0^1 x^{\frac{3}{2}} (1-x^2)^{\frac{5}{2}} \, dx$ . 6M CO5 L5

OR

11. a) State and prove relation between Beta and Gamma functions. 6M CO5 L2  
 b) Evaluate  $\int_0^1 \frac{x^2}{\sqrt{1-x^5}} \, dx$  in terms of  $\beta$  function. 6M CO5 L5

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**Code: 20AC13T**

I B.Tech. I Semester Supplementary Examinations Dec 2023 / Jan 2024

### **Chemistry**

(Common to CSE, AI&DS, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

#### **PART-A**

( **Compulsory question** )

- |   |     |    |
|---|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M )   | CO  | BL |
| a) Define electrode potential.  | CO1 | L1 |
| b) Differentiate between primary and secondary batteries.                   | CO2 | L2 |
| c) What is a polymer, and provide an example of a common synthetic polymer. | CO3 | L1 |
| d) What is chromatography? Explain their types.                             | CO4 | L1 |
| e) What is a molecular motor?   | CO5 | L2 |

#### **PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

#### **UNIT-I**

- |   |     |     |    |
|---|-----|-----|----|
| 2. Derive the Nernst equation for a single electrode. Write any four applications of the Nernst equation. | 12M | CO1 | L3 |
|---|-----|-----|----|

**OR**

- |   |    |     |    |
|---|----|-----|----|
| 3. a) Distinguish between a galvanic cell and an electrolytic cell. | 6M | CO1 | L4 |
| b) State the sign convention for electrode potentials.              | 6M | CO1 | L1 |

#### **UNIT-II**

- |   |     |     |    |
|---|-----|-----|----|
| 4. List the key components of a Leclanche cell and describe their functions in the overall operation of the cell. | 12M | CO2 | L1 |
|---|-----|-----|----|

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 5. Describe the operation of a hydrogen and oxygen fuel cell, including its properties and applications. | 12M | CO2 | L1 |
|--|-----|-----|----|

#### **UNIT-III**

- |  |    |     |    |
|--|----|-----|----|
| 6. a) List the factors that determine the functionality of monomers. | 6M | CO3 | L1 |
| b) Define each type of polymerization with examples.                 | 6M | CO3 | L1 |

**OR**

- |  |     |     |    |
|--|-----|-----|----|
| 7. Explain the mechanisms of cationic and anionic addition polymerization. | 12M | CO3 | L2 |
|--|-----|-----|----|

**UNIT-IV**

8. Summarize Beer-Lambert's Law and its significance in quantitative analysis. 12M CO4 L5

**OR**

9. Explain the principle of separation in TLC, including the interaction between the stationary phase and the mobile phase. Write five applications. 12M CO4 L2

**UNIT-V**

10. Propose a system based on catenanes for a specific application, considering its structural features. 12M CO5 L3

**OR**

11. Explain the effect of light and the pH effect of a molecular switch with an example. 12M CO5 L2

\*\*\* End \*\*\*

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**Code: 20AC15T**

I B.Tech. I Semester Supplementary Examinations Dec 2023 / Jan 2024

**Communicative English**

(Common to CE, ME, CSE, AI&DS, CSE(AI) and CSE(DS))

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

( Compulsory question )

1. Answer **all** the following short answer questions ( 5 X 2 = 10M )
- |  |    |    |
|--|----|----|
|  | CO | BL |
|--|----|----|
- a) What emotions did Hazlitt's son express when he was moved to a new school? CO1 L2
- b) What is the poem "The Brook" about? CO2 L2
- c) At what age the prince 'Dimitri' came into the throne of 'Kedaria'? CO1 L2
- d) When was Mohammad Yunus awarded 'Nobel Peace Prize'? CO1 L2
- e) What is the name of the training academy established by Mrinalini Sarabhai? L1  
CO2

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

2. What does the author say about despising people? What justification does he provide for his advice? 12M CO1 L2

**OR**

3. a) **Change the following statements into questions:**
- i) My grandparents live with my uncle.
  - ii) He had a strange experience yesterday.
  - iii) Her mother has bought a nice gift for her.
  - iv) Jack has bought an interesting book from the library.
  - v) They have accepted the invitation.
  - vi) My neighbor is a kind-hearted lady. 6M CO3 L4
- b) **Identify the Parts of Speech of the underlined words in the following sentences:**
- i) The car moved slowly around the track.
  - ii) He walked through the park.
  - iii) They waited anxiously for the game to begin. 6M CO3 L4

**UNIT-II**

4. How has the poet drawn parallelism between the journey of the brook and the life of man? 12M CO2 L2

OR

## 5. Fill in the blanks with the appropriate article or no article:

- i) This is \_\_\_\_ interesting book.
- ii) My father is \_\_\_\_ police office.
- iii) She picked me at \_\_\_\_ airport.
- iv) Experts say that \_\_\_\_ coffee is good for health.
- v) They are having \_\_\_\_ party next week.
- vi) He is wearing \_\_\_\_ black suit to the wedding.
- vii) I am looking for \_\_\_\_ job in marketing.
- viii) He climbed \_\_\_\_ Mount Everest.
- ix) The doctor prescribed \_\_\_\_ medicine for my headache.
- x) We bought some cheese and jam. \_\_\_\_ cheese was delicious.
- xi) Our library has three copies of \_\_\_\_ Mahabharata.
- xii) This is \_\_\_\_ great service to humanity.

12M CO4 L3

## UNIT-III

## 6. How does Dimitri escape himself from the death trap?

12M CO1 L3

OR

## 7. Write a detailed note on Summarizing Skills.

12M CO5 L4

## UNIT-IV

## 8. Why did Mohammed Yunus establish Grameen Bank and how it helped the rural women in Bangladesh?

12M CO2 L1

OR

## 9. Develop the following hints into a meaningful passage.

Without hard work - no knowledge - all things – difficult initially – climbing mountains – get arduous training live in camps – minimum food – more hardships – risking life – lesson – no achievement without self – sacrifice – adequate – preparation – high achievers – overcome more difficulties.

12M CO5 L4

## UNIT-V

## 10. Narrate the inspiring story of Mrinalini Sarabhai and describe the left by her for future generation.

12M CO4 L3

OR

## 11. Write a letter to the District Magistrate, drawing his attention to the nuisance of loud speakers in your locality.

12M CO5 L4

\*\*\* End \*\*\*

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**Code: 20A511T**

I B.Tech. I Semester Supplementary Examinations Dec 2023 / Jan 2024

**Problem Solving through C Programming**

(Common to All Branches)

Max. Marks: 70

Time: 3 Hours

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. In Part-A, each question carries **Two marks**.  
3. Answer **ALL** the questions in **Part-A** and **Part-B**

**PART-A**

( **Compulsory question** )

- |   |     |    |
|---|-----|----|
| 1. Answer <b>all</b> the following short answer questions ( 5 X 2 = 10M ) | CO  | BL |
| a) What is the size of integer data type?                                 | CO1 | L1 |
| b) Differentiate do-while and while statements.                           | CO2 | L2 |
| c) List the various storage classes in C.                                 | CO3 | L1 |
| d) What is a void pointer?  | CO4 | L1 |
| e) Give various modes of opening a file.                                  | CO5 | L1 |

**PART-B**

Answer **five** questions by choosing one question from each unit ( 5 x 12 = 60 Marks )

Marks CO BL

**UNIT-I**

- |  |    |     |       |
|--|----|-----|-------|
| 2. a) What are the various steps to solve a problem?<br>Explain them by taking an example. | 6M | CO1 | L1,L2 |
| b) Draw a flow chart to find the largest of three numbers in C.                            | 6M | CO1 | L3    |

**OR**

- |   |    |     |       |
|---|----|-----|-------|
| 3. a) Explain the Structure of C program.                 | 6M | CO1 | L2,L3 |
| b) How many keywords does C Language support?<br>Explain. | 6M | CO1 | L1,L2 |

**UNIT-II**

- |   |    |     |       |
|---|----|-----|-------|
| 4. a) Explain Nested if else statements with an example.              | 6M | CO2 | L2    |
| b) Write a C program to find the smallest number among three numbers. | 6M | CO2 | L1,L3 |

**OR**

- |   |    |     |       |
|---|----|-----|-------|
| 5. a) Describe about two dimensional arrays, initializing the two dimensional arrays and accessing elements in such arrays. | 6M | CO2 | L2    |
| b) Write a program to find an element present in a given array by using any one search technique.                           | 6M | CO2 | L1,L3 |

**UNIT-III**

6. Explain briefly about string handling functions in C with examples. 12M CO3 L2

**OR**

7. a) Differentiate call by value and call by reference with example 6M CO3 L1,L3  
 b) Illustrate the concept of recursion. 6M CO3 L2

**UNIT-IV**

8. a) Define a pointer. How to initialize and declare pointer variables? Explain the same with examples 6M CO4 L1,L2  
 b) Explain how to pass one dimensional arrays to functions 6M CO4 L2

**OR**

9. a) Write advantages and disadvantages of pointers 6M CO4 L1,L3  
 b) Write a C program to find the greatest and smallest element in an array using pointers. 6M CO4 L1,L3

**UNIT-V**

10. a) Differentiate between structures and unions, and write the syntax for nested structures 6M CO5 L1,L2  
 b) What is an enumerated data type? Explain with example. 6M CO5 L1,L2

**OR**

11. a) Explain the syntax for Nested structures. Describe Nested structures with an example. 6M CO5 L2  
 b) Write a C program to reverse the contents of a file 6M CO5 L1,L2

\*\*\* End \*\*\*