**B.TECH VI SEMESTER (R20)  
B.TECH - VI SEMESTER (R20)  
REGULAR / SUPPLEMENTARY EXAMINATIONS - JUN 2024  
COMPUTER NETWORKS**

**Time: 3 Hours Max. Marks: 70**

## PART A

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| Q.No | Question | CO | BT |
| 1 | \*\*B.Tech VI Semester (R20) Computer Networks Exam\*\* | COX | BTY |
| 2 | \*\*Time:\*\* 3 Hours \*\*Max Marks:\*\* 70 | COX | BTY |
| 3 | \*\*PART A (20 Marks)\*\* | COX | BTY |
| 4 | Answer all questions. Each question carries 2 marks. | COX | BTY |
| 5 | 1. Define the rank of a matrix. What is the condition for the existence of a unique solution to a system of linear equations? (CO1, BT1) 2. State Rolle's Theorem. Give an example of a function that satisfies the conditions of Rolle's Theorem. (CO2, BT1) 3. What is a Jacobian matrix? When is it used? (CO2, BT1) 4. Evaluate the double integral ∬<sub>R</sub> xydA where R is the region bounded by y = x and y = x². (CO3, BT2) 5. Explain the difference between a scalar point function and a vector point function. (CO4, BT1) 6. Find the divergence of the vector field \*\*F\*\* = x²i + y²j + z²k. (CO4, BT2) 7. What is a solenoidal vector field? Give an example. (CO4, BT1) 8. Define a line integral. When is a line integral independent of the path? (CO5, BT1) 9. State Green's theorem. (CO5, BT1) 10. What is the significance of Gauss's divergence theorem? (CO5, BT1) | COX | BTY |
| 6 | \*\*PART B (50 Marks)\*\* | COX | BTY |
| 7 | Answer one question from each unit. Each question carries 10 marks. | COX | BTY |
| 8 | \*\*UNIT 1: MATRICES\*\* | COX | BTY |
| 9 | 11. a) Solve the following system of linear equations using Gauss elimination method:  2x + y – z = 8  -3x – y + 2z = -11  -2x + y + 2z = -3 | COX | BTY |
| 10 | b) Find the eigenvalues and eigenvectors of the matrix A = [[2, 1], [1, 2]]. (CO1, BT3) | COX | BTY |

## PART B

### UNIT-1

11. \*\*OR\*\*

(Or)

12. 11. a) Verify Cayley-Hamilton theorem for the matrix A = [[1, 2], [3, 4]]. Find A⁻¹. (CO1, BT3)

### UNIT-2

13. b) Diagonalize the matrix A = [[1, 0], [1, 1]]. (CO1, BT3)

(Or)

14.   
\*\*UNIT 2: DIFFERENTIAL CALCULUS AND ITS APPLICATIONS\*\*

### UNIT-3

15. 12. a) Using Taylor's theorem, expand e<sup>x</sup> about x = 0 up to the term containing x³.

(Or)

16. b) Find the maximum and minimum values of the function f(x, y) = x² + y² – 2x – 6y + 14. (CO2, BT3)

### UNIT-4

17. \*\*OR\*\*

(Or)

18. 12. a) Find the Jacobian of the transformation x = u² - v², y = 2uv.

### UNIT-5

19. b) Using the method of Lagrange multipliers, find the minimum value of f(x, y, z) = x² + y² + z² subject to the constraint x + y + z = 1. (CO2, BT3)

(Or)

20.   
\*\*UNIT 3: MULTIPLE INTEGRALS\*\*