**B C A DEGREE END SEMESTER EXAMINATION - MARCH 2024**

SEMESTER 2 - MATHEMATICS (COMPLEMENTARY FOR BCA)

COURSE : **19U2CPCMT2 - DISCRETE MATHEMATICS**

(For Regular - 2023 Admission and Improvement/Supplementary – 2022/2021/2020/2019 Admissions)

Time : Three Hours   Max. Marks: 75

PART A
Answer any 10 (2 marks each)

1. Using iteration method, solve the equation $x^3 + x^2 - 1 = 0$, with the initial approximation as x_0= 0.7, correct to 2 decimal places.

2. Evaluate $\int_0^4 e^x \, dx$ by Simpson's rule, given that e = 2.72, e^2= 7.39, e^3 = 20.09, e^4 = 54.6.

3. Compute the trapezoidal approximation for $\int_0^2 \sqrt{x} \, dx$ using a regular partition with n = 4.

4. Verify Hand shaking theorem for the following graph G.
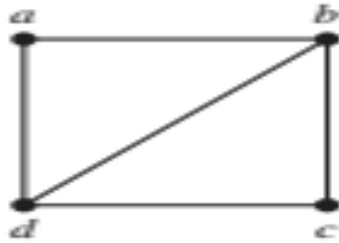
5. Find a Spanning tree for (a) $K_{1,6}$
   (b) K_4.

6. Verify Hand shaking theorem for the following graph G.
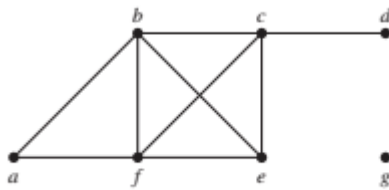
7. Determine the coefficient of $w^3x^2y^2z^2$ in the expansion of $(w+x+y+z+1)^{10}$?

8. How many ways are there to select 2 cards such that the first card is an ace and the second card is not a king?

9. Explain the Gauss elimination method.

10. Using Gauss elimination method, solve 6x - y - z = 19; 3x + 4y + z = 26; x + 2y + 6z = 22.

11. Using Euler's method, find an approximate value of y corresponding to x = 1.2 , given that $\frac{dy}{dx} = x + 2y$ and y(1) = 1 taking grid size h = 0.1.

12. What is the coefficient of $x^{12}y^{13}$ in the expansion of $(x + y)^{25}$?

(2 x 10 = 20)

PART B
Answer any 5 (5 marks each)

13. Draw all spanning trees of $K_{2,2}$.

14. Solve the system of linear equations x + 2y + z = 8 ; 2x + 3y + 4z = 20 ; 4x + 3y + 2z = 16 using Gauss Jordan method.

15. Given the following tabulated values of a function :

x :	1.2	1.4	1.6	1.8	2.0	2.2
y :	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

Prepare a difference table and evaluate y$'$ at x = 1.2

16. Suppose that a connected planar graph has 6 vertices, each of degree 4. Into how many regions is the plane divided by a planar representation of this graph?

17. Solve the system of linear equations 2x + y + z = 10 ; 3x + 2y + 3z = 18 ; x + 4y + 9z = 16 using Gauss elimination method..

18. (i) In how many ways a committee of 5 teachers and 4 students be chosen from 9 teachers and 15 students?
(ii) In how many ways can the committee in (i) be formed if teacher A refuses to serve if student B is on the committee?

19. Apply Taylor series method using first 5 terms of the series, solve $\frac{dy}{dx}$ = 2x + 3y, y (0) = 1 and find y (0.1).

20. (i) In how many ways can a committee of 5 are chosen from 9 people?
(ii) How many committees of 5 or more can be chosen from 9 people?

(5 x 5 = 25)

PART C
Answer any 3 (10 marks each)

21. How many strings of eight English letters are there
a) that contain no vowels, if letters can be repeated?
b) that contain no vowels, if letters cannot be repeated?
c) that start with a vowel, if letters can be repeated?
d) that start with a vowel, if letters cannot be repeated?
e) that contain at least one vowel, if letters can be re-
peated?

22. Use Runge- Kutta method to find y when x = 1.2 in steps of 0.1 given that $\frac{dy}{dx} = x^2 + y^2$ and y (1) = 1.5.

23. Use Dijkstra's algorithm to find the length of a shortest path between the vertices a and z in the weighted graph given below.
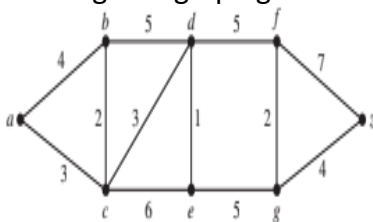
24. Using Gauss-Seidel iteration method, solve the system of equations
10x - 5y - 2z = 3 ; 4x - 10y + 3z = -3 ; x + 6y + 10z = -3.

(10 x 3 = 30)