Reg. No ..... Name **23U247**

B C A DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 2 : MATHEMATICS (COMPLEMENTARY FOR BCA)

COURSE : **19U2CPCMT2: DISCRETE MATHEMATICS**

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

Time : Three Hours Max. Marks: 75

PART A

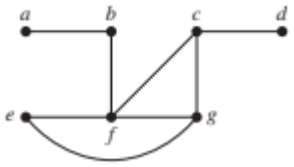
Answer any 10 (2 marks each)

1. In how many ways the letters of the word "LIBERTY" can be arranged?
2. Use Euler's method to approximate y when x = 0.1 given that $\frac{dy}{dx} = \frac{y-x}{y+x}$, y(0) = 1 by taking h = 0.05.
3. The speed, v metres per second, of a car, t seconds after it starts, is shown in the following table :

t	0	12	24	36	48	60	72	84	96	108	120
v	0	3.60	10.08	18.90	21.60	18.54	10.26	5.40	4.50	5.40	9.00

Using Simpson's rule, find the distance travelled by the car in 2 minutes.

4. Use Newton-Raphson method to find $\sqrt[3]{18}$ correct to 3 decimal places, assuming 2 as the initial approximation.
5. Solve $y' = -y$; y (0) = 1 by Euler's method for y(0.04).
6. Determine the coefficient of $w^2x^2y^2z^2$ in the expansion of $(2w-x+3y+z-2)^{12}$?
7. Use the method of iteration to solve the equation $x = e^{-x}$, starting with x_0 =1, correct to 3 decimal places.
8. Find two spanning trees for the following graph



9. Is $K_{2,3}$ planar? Explain.
10. How many different license plates can be made if each plate contains a sequence of three uppercase English letters followed by three digits?
11. If a graph contains 24 edges and all vertices are of the same degree, then find the number of vertices?
12. Use Newton's method to find the root of $x^3 - 2x - 5 = 0$, correct to 2 decimal places with x_0 = 2.

(2 x 10 = 20)

PART B

Answer any 5 (5 marks each)

13. Using Euler's method,find y(0.6) of $y' = 1 - 2xy$ given that y(0) = 0 by taking h = 0.2.
14. How many number greater than one million can be formed without repetition with the digits 4,6,6,0,3,6,3?

15. If a connected planar simple graph has 20 vertices,each of degree 3.Into how many regions does a representation of this planar graph split the plane?

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

17. From the following data:

x :	0.00	0.05	0.10	0.15	0.20	0.25
y:	0.00000	0.10017	0.20134	0.30452	0.41075	0.52110

Evaluate $\frac{dy}{dx}$ at x = 0.

18. How many bit strings of length eight either start with a 1 bit or end with the two bits 00?

19. Find a root of the equation $x^3 - 5x + 3 = 0$correct to 3 deimals using Newton Raphson's method.

20. Find the real root of the equation $x^3 - x - 1 = 0$ correct to two decimal places by iterative method.

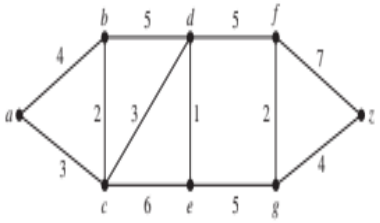
(5 x 5 = 25)

PART C
Answer any 3 (10 marks each)

21. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,
(i) do the words start with C.
(ii) do all the vowels always occur together.
(iii) do the vowels never occur together.
(iv) do the words begin with I and end in P?

22. Use the Runge-Kutta fourth order method to find y (0.2) with h = 0.1 for the initial value problem $y' = xy + y^2$, y(0) = 1.

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. Use Gauss Jordan method to solve x + 2y + z -w = -2 ; 2x + 3y - z + 2w = 7 ; x + y + 3z - 2w = -6 ; x + y + z + w = 2.

(10 x 3 = 30)