**B C A  DEGREE END SEMESTER EXAMINATION - JULY 2021**

**SEMESTER 2 : COMPLEMENTARY MATHEMATICS FOR B C A**

COURSE : **19U2CPCMT2 ; DISCRETE MATHEMATICS**

*(Common for Regular 2020 Admission & Improvement/Supplementary 2019 Admission)*

Time : Three Hours                                                                               Max. Marks: 75

**PART A**
**Answer any 10 (2 marks each)**

1. What is the coefficient of $x^7$ in $(1 + x)^{11}$?

2. In how many ways can four mathematics books,three history books,three chemistry books and two sociology books be arranged on a shelf so that all books of the same subject are together?

3. Determine the coefficient of $w^2x^2y^2z^2$ in the expansion of $(2w-x+3y+z-2)^{12}$?

4. (a) Define planar graph?
   (b) Is $K_4$ planar?

5. Find a Spanning tree for (a) $K_{1,6}$
   (b) $K_4$.

6. Verify Euler's formula for the following planar graph?
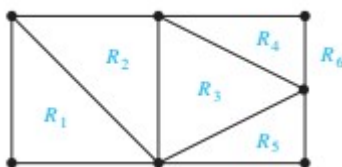


7. Explain Gauss-Seidel iteration method.

8. Use the method of iteration to solve the equation $x = e^{-x}$, starting with  $x_0$ =1, correct to 3 decimal places.

9. Use Newton's method to  find the root of $x^3 - 2x - 5 = 0$, correct to 2 decimal places with $x_0$ = 2.

10. 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.

11. Solve $y' = -y$ ; y (0) = 1 by Euler's method for y(0.04).

12. 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.

**(2 x 10 = 20)**

**PART B**
**Answer any 5 (5 marks each)**

13. In how many ways a football eleven can be chosen out of 17 players when (i) five particular players are to be always included?
    (ii) two particular players are to be always excluded?

14. How many words, with or without meaning,each of 3 vowels and 2 consonants can be formed from the letters of the word INVOLUTE?

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. Describe Prim's algorithm ?

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

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

19. Employ Taylor's method to obtain approximate value of y at x = 0.2 for the differential equation $\frac{dy}{dx}$ = 2y + 3e$^x$ , y(0)= 0.

20. Solve y$^{'}$ = y$^2$ + x , y(0) = 1 using Taylor series method and compute y(0.1) and y(0.2).

**(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 Dijkstra's algorithm to find the length of a shortest path between the vertices a and z in the weighted graph given below.
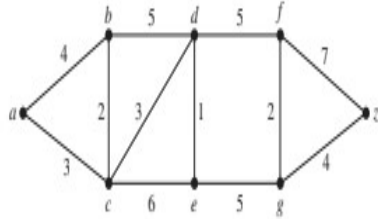


23. Using Gauss-Seidel iteration method, solve the system of equations
    8x - 3y + 2z = 20 ; 4x - 11y - z = 33 ; 6x + 3y + 12z = 35.

24. Find the first, second and third derivatives of the function tabulated below, at the point x = 1.5.

| x | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
|------|-------|-----|--------|------|--------|------|
| f(x) | 3.375 | 7.0 | 13.625 | 24.0 | 38.875 | 59.0 |

**(10 x 3 = 30)**