Reg. No…….. Name…… **20U240**

B. Sc. DEGREE END SEMESTER EXAMINATION – MARCH 2020

SEMESTER **– 2: MATHEMATICS (COMPLEMENTARY COURSE TO BCA)**

COURSE: **19U2CPCMT2: DISCRETE MATHEMATICS**

(For Regular - 2019 Admission)

Time: Three Hours Maximum Marks: 75

PART A

Answer any ten questions. Each question carries 2 marks.

1. Find the number of bit strings of length 8 that begin with 1011.
2. A box that contains 8 green balls and 6 red balls is kept in a completely dark room. What is the least number of balls one must take out from the box so that at least two balls will be same color?
3. How many dance pairs, (dance pairs means a pair of man and woman) can be formed from a group of 6 women and 10 men?
4. Does there exist a simple graph with 6 vertices having degrees 2, 2, 2, 4, 5, 5? Justify your answer.
5. Draw a directed graph represented by given adjacency matrix

$$\begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$$

6. Define Euler graph. Give an example of a complete graph which is also Euler graph.
7. Use Newton-Raphson method to find $\sqrt[3]{18}$ correct to 3 decimals, assuming 2 as the initial approximation.
8. Use the method of iteration to solve the equation $x = e^{-x}$, starting with $x_0 = 1$, correct to 3 decimal places.
9. Using Gauss elimination method, solve $6x - y - z = 19$, $3x + 4y + z = 26$, $x + 2y + 6z = 22$
10. Using Euler's method, find an approximate value of y corresponding to $x = 1.5$, given that $\frac{dy}{dx} = x + 2y$ and $y(1) = 1$. Take grid size $h = 0.1$.
11. Compute the trapezoidal approximation for $\int_0^2 \sqrt{x}\,dx$ using a regular partition with $n = 4$.
12. Use Simpson's one third rule to approximate $\int_0^1 x^4\,dx$ using a regular partition with $n = 4$.

(2 x 10 = 20)

PART B

Answer any five questions. Each question carries 5 marks

13. A committee of 6 is to be made from 4 students and 8 teachers. In how many ways can this be done

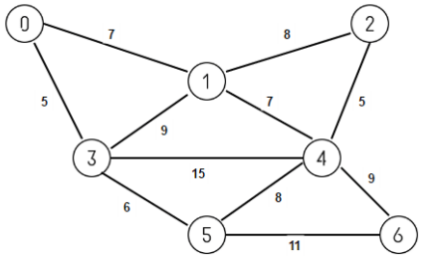
    a) If the committee contains exactly 3 students?

    b) If the committee contains at least 3 students?

14. Find the positive integer(s) n such that $P(n+1,3)=10\times P(n-1,2)$.

15. Prove that there exist only one path between any two vertices in a tree.

16. Find the minimal spanning tree of the following graph. Is there any other spanning tree for this graph?



17. Apply Gauss-Seidel method to solve $5x+2y+z=12$, $x+4y+2z=15$, $x+2y+5z=20$ correct upto 4 decimal places, taking $x_0=y_0=z_0=0$.

18. Find the inverse of the matrix $\begin{bmatrix} 3 & -2 & 5 \\ 0 & -1 & 6 \\ -4 & 2 & -1 \end{bmatrix}$ using Gauss Jordan method.

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

20. Use Simpson's 3/8 method to solve the integral $\int_0^3 \frac{dx}{1+x}$, with $n=6$. (5 x 5 = 25)

PART C

Answer any three questions. Each question carries 10 marks

21. Find the number of 6 letter words that can be formed from the letters of the word HISTORY if no letters is used more than once in any word subject to the conditions given below:

    a) The first letter of each word is H.

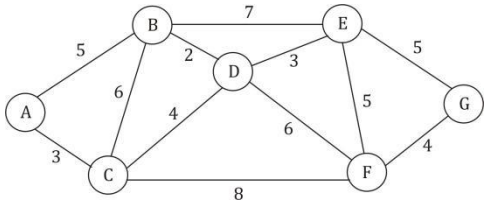
    b) The first letter of each word is either H or Y.

c) The word starts with HIS.

d) The word contains HIS as a sub-string.

22. a) Draw a simple planar graph with 8 vertices and 18 edges. Is it possible to add one more edge such that the graph still be a simple planar?

b) Write an algorithm for Dijkstra's Algorithm and using this algorithm find the shortest path from node A to other vertices.



23. Use the Runge-Kutta fourth order method to find $y(0.2)$ with $h=0.1$ for the initial value problem $\frac{dy}{dx}=\sqrt{x+y}, y(0)=1$.

24. Use Gauss Jordan elimination method to solve $2x+3y-4z+2w=-4$, $x+2y+3z-4w=7$, $4x-y+2z-2w=7$, $3x+5y-z+6w=5$.

(10 x 3 = 30)

****