Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/Improvement) Examination, April 2024
(2019 to 2022 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
4C04MAT-BCA : Mathematics for BCA – IV

Time : 3 Hours   Max. Marks : 40

PART – A

Answer **any 4** questions out of 5 questions. **Each** question carries 1 mark.   (4×1=4)

1. Define mutually exclusive events.

2. Find the chance of throwing 'four' with an ordinary six faced die.

3. Define a tree.

4. Define connected network.

5. Write the general formula of Trapezoidal rule.

PART – B

Answer **any 7** questions out of 10 questions. **Each** question carries **2** marks.   (7×2=14)

6. Find the number of permutations of all the letters of the word 'COMMITTEE'.

7. What is the chance that a leap year selected at random will contain 53 Sundays ?

8. Find the chance of throwing an even number with an ordinary six faced die.

9. An agriculture has a farm with 125 acres. He produces Radish, Muttar and Potato. Whatever he raises is fully solid in the market. He gets Rs. 5 for Radish per Kg, Rs. 4 for Muttar per Kg and Rs. 5 for Potato per Kg. The average yield is 1500 Kg of Radish per acre, 1800 Kg of Muttar per acre and 1200 Kg of Potato per acre. To produce each 100 Kg of Radish and Muttar and to produce each 80 Kg of Potato, a sum of Rs. 12.50 has to be used for manure. Labour required for each acre to raise the crop is 6 man days for Radish and Potato each and 5 man days for Muttar. A total of 500 man days of labour at a rate of Rs. 40 per man days are available. Formulate this as a linear programming model to maximize the agriculturist's total profit.

10. A company makes two kinds of leather belts. Belt A is a high quality belt and belt B is of lower quality. The respective profits are Rs. 4.00/- and Rs. 3.00/- per belt. Each belt of type A requires twice as much time as a belt of type B and if all belt were of type B, the company could make 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 buckles per day are available. There are only 700 buckles a day available for belt B. Determine the optimal product mix.

11. Explain graphical method.

12. Explain directed network with an example.

13. Define directed paths and cycles.

14. Explain Simpson's $\frac{1}{3}$ rule.

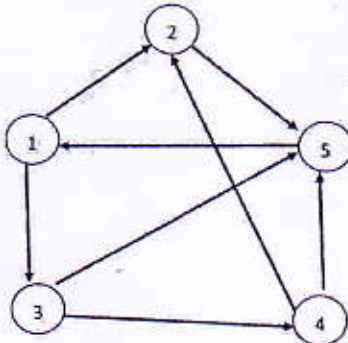15. Write Runge-Kutta fourth order formula.

PART – C

Answer **any 4** questions out of 7 questions. Each question carries **3** marks. · **(4×3=12)**

16. From six engineers and five architects a committee is to be formed having three engineers and two architects. How many different committee can be formed if

    i) there is no restriction ?

    ii) two particular engineers must be included ?

17. Given $P(A) = \frac{1}{4}, P(B) = \frac{1}{3}, P(A \cup B) = \frac{1}{2}$. Evaluate P(A/B) and P(B/A).

18. Find the maximum value of $z = 107x_1 + x_2 + 2x_3$

    subject to the constraints $14x_1 + x_2 - 6x_3 + 3x_4 = 7$
    $$16x_1 + x_2 - 6x_3 \leq 5$$
    $$3x_1 - x_2 - x_3 \leq 0, x_1 \geq 0; x_2 \geq 0; x_3 \geq 0, x_4 \geq 0.$$
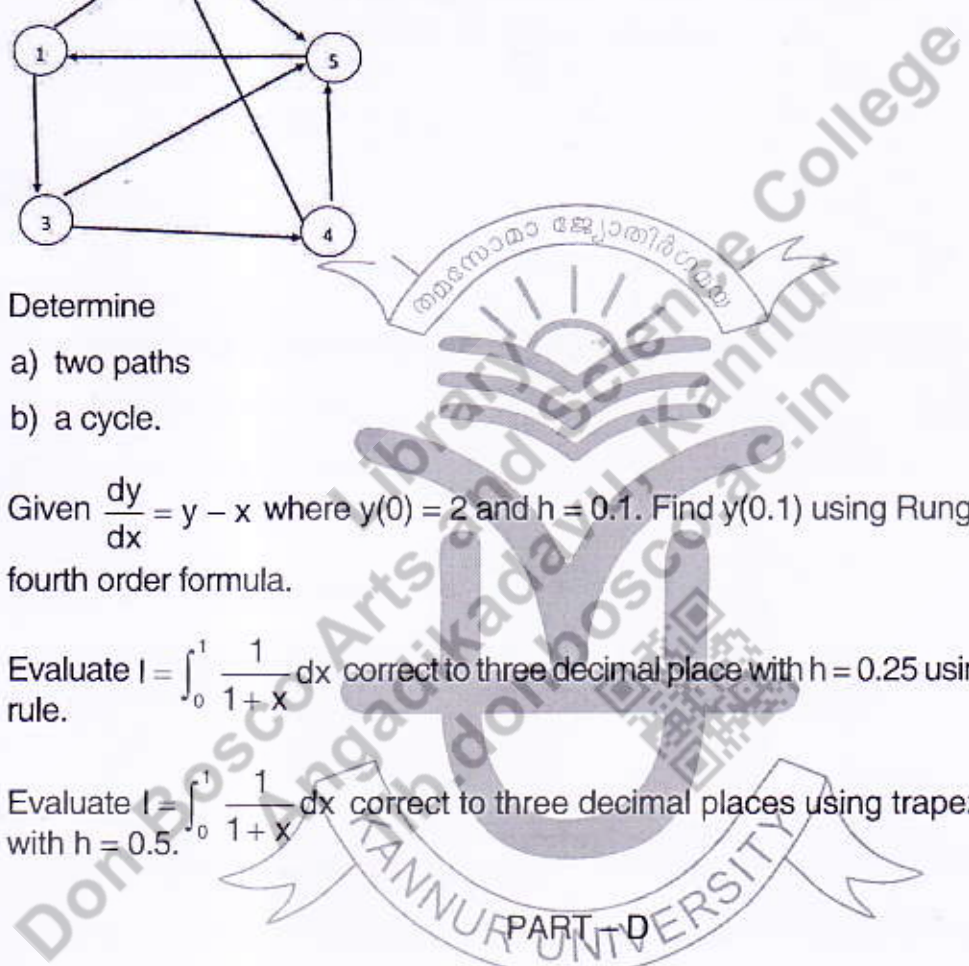
19. Consider the following network

Determine

a) two paths

b) a cycle.

20. Given $\dfrac{dy}{dx} = y - x$ where $y(0) = 2$ and $h = 0.1$. Find $y(0.1)$ using Runge-kutta fourth order formula.

21. Evaluate $I = \int_0^1 \dfrac{1}{1+x}\,dx$ correct to three decimal place with $h = 0.25$ using Simpson's rule.

22. Evaluate $I = \int_0^1 \dfrac{1}{1+x}\,dx$ correct to three decimal places using trapezoidal rule with $h = 0.5$.

PART – D

Answer **any** 2 questions out of 4 questions. **Each** question carries **5** marks.   (2×5=10)
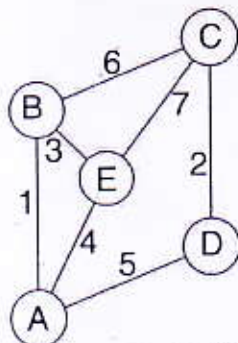
23. A five figure number is formed by the digits 0, 1, 2, 3, 4 without repetition. Find the probability that the number formed is divisible by 4.

24. Use simplex method to solve the following LPP

Maximize $z = 4x_1 + 10x_2$

subject to the constraints $2x_1 + x_2 \le 50$

$$2x_1 + 5x_2 \le 100$$
$$2x_1 + 3x_2 \le 90, \quad x_1 \ge 0;\ x_2 \ge 0.$$

25. Use Dijikstra's algorithm to determine a shortest path from A to C for the following network.

26. If $y' = x - y^2$ and $y(0) = 1$, then find $y(0.1)$ correct to four decimal places by Taylor series for $y(x)$.