Reg. No. : ....

Name : ....

IV Semester B.Sc. Degree (C.B.C.S.S. – OBE-Regular/Supplementary/
Improvement) Examination, April 2025
(2019 to 2023 Admissions)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
4C04MAT-BCA : Mathematics for BCA – IV

Time : 3 Hours

Max. Marks : 40

SECTION – A

Answer **any four** questions. **Each** question carries 1 mark each.   (4×1=4)

1. State the principle of counting.

2. Prove that $nC_r = nC_{n-r}$.

3. State the Trapezoidal rule for Numerical Integration.

4. Define the term 'decision variable' in connection with an LPP.

5. Write any one basic assumption that is necessary for a LPP.

SECTION – B

Answer **any seven** questions from the following. **Each** question carries **2** marks.

(7×2=14)

6. State the Empirical definition of Probability.

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

8. Write the standard form of the following LPP.

   Maximize $z = 3x_1 + 2x_2$

   Subject to the constraints : $x_1 \le 2$, $x_1 - x_2 \le 3$, $x_1 \ge 0$, $x_2 \ge 0$.

P.T.O.

9. Define the following terms :

    i) slack

    ii) surplus

10. Write any two advantages of Simpson's 1/3 rule.

11. Write Runge-Kutta fourth order formula.

12. Write the sample space corresponding to the random experiment of tossing two coins simultaneously.

13. Briefly explain the shortest route problem.

14. What is the significance of the feasible region in a Linear Programming Problem ?

15. Define cycles.

SECTION – C

Answer **any four** questions. **Each** question carries 3 marks. (4×3=12)

16. A coin is tossed four times. Find the probability of getting

    i) Exactly one head   ii) At least one head.

17. Find the number of words formed from the letters of the word 'STATISTICS'. Also find how many of them start with 'S' and end with 'S'.

18. Use graphical method to solve the following LPP.

    Maximize $z = 3x_1 - 2x_2$

    Subject to the constraints : $x_1 + x_2 \leq 2$, $2x_1 + x_2 \leq 2$, $x_1 \geq 0$, $x_2 \geq 0$.

19. Use Modified Euler's method to solve $\frac{dy}{dx} = x+y$ for $x = 0.75$ and $h = 0.25$ with the boundary condition $y = 2$ when $x = 0$.

20. Use Euler's method to approximate y when $x = 0.1$ given that $\frac{dy}{dx} = \frac{y-2x}{y+2x}$ with $y = 2$ for $x = 0$ (Take $h = 0.025$).

21. Apply Simpson's one third rule to evaluate $\int_0^4 \frac{1}{1+x^2} dx$ with h = 1.

22. Evaluate $\int_1^5 \frac{1}{1+x^2} dx$ using Trapezoidal rule.

SECTION – D

Answer **any two** questions. **Each** question carries 5 marks.   (2×5=10)

23. A four digit number is formed by the digits 0, 3, 8, 5 without repetition. Find the probability that the number formed is divisible by 2 or by 5.

24. Use Simplex method to solve the following LPP.

    Maximize z = 3x$_1$ + 4x$_2$

    Subject to the constraints : $2x_1 + 3x_2 \le 12$, $3x_1 + 2x_2 \le 12$, $x_1 \ge 0$, $x_2 \ge 0$.

25. Use Taylor series method to find y for x = 0.1 correct to four decimal places, if y satisfies $\frac{dy}{dx} = y + x^2$ with $y_0 = 2$, $x_0 = 0$.

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