K16U 0626

Reg. No. : ....

Name : ....

IV Semester B.C.A. Degree (CBCSS 2014 Admn.-Regular) Examination, May 2016
COMPLEMENTARY COURSE IN MATHEMATICS
4C04 MAT – BCA : Mathematics for BCA – IV

Time : 3 Hours Max. Marks : 40

SECTION – A

All the **4** questions are **compulsory**. They carry **1** mark **each**.

1. A fair coin is tossed twice. What is the expected number of heads ?
2. State the Fundamental Theorem of Linear Programming.
3. What do you mean by interpolation ?
4. What is meant by the backward differences of a function ? **(4×1=4)**

SECTION – B

Answer **any 7** questions from among the questions **5** to **13.** These questions carry **2** marks **each.**

5. Let X denote the number of times heads occurs when a fair coin is tossed six times. Compute the variance of X.
6. Suppose a random variable X has mean $\mu = 25$ and standard deviation $\sigma = 2$. Use Chebyshev's inequality to estimate $P(X \leq 35)$.
7. There are three envelops containing \$ 100, \$ 200 and \$ 6000, respectively. A player selects an envelope and keeps what is in it. Find the expected winnings of the player.
8. Let $x_1 = 2$, $x_2 = 4$, $x_3 = 1$ be a feasible solution to the system of equations, $2x_1 - x_2 + 2x_3 = 2$, $x_1 + 4x_2 = 18$. Reduce the given feasible solution to a basic feasible solution.

P.T.O.

9. Show that the set of feasible solutions to an L.P.P. is a convex set.

10. Give the canonical form of a linear programming problem and explain its characteristics.

11. Find an approximate value of a real root of the equation $x^3 - 2x - 5 = 0$, by the bisection method.

12. Given $\frac{dy}{dx} = x + y; y(0) = 0$, compute y(0.2) using Euler's modified method.

13. Solve the equation $y' = x + y^2$, subject to the condition y = 1 when x = 0 by Picard's method. **(7×2=14)**

SECTION – C

Answer **any 4** questions from among the questions **14** to **19.** These questions carry **3** marks **each.**

14. Let X be a random variable with distribution :

x	1	2	3
P(X = x)	0.3	0.5	0.2

Find the distribution, mean and standard deviation of the random variable $Y = x^3$.

15. Maximize $z = 4x_1 + 3x_2$ subject to the constraints:

$2x_1 + x_2 \leq 1000,\ x_1 + x_2 \leq 800,\ x_1 \leq 400,\ x_2 \leq 700,\ x_1 \geq 0,\ x_2 \geq 0.$

16. Using Lagrange's interpolation formula, find the form of the function y(x) from the following table :

x	0	1	3	4
y	–12	0	12	24

17. Find a real root of the equation $x = e^{-x}$, using the Newton-Raphson method.

18. Evaluate $I = \int_0^1 \frac{1}{1+x} dx$ correct to three decimal places using both the Trapezoidal and Simpson's rules with h = 0.5.

19. Use Runge-Kutta second-order formula to find y(0.1) and y(0.2), given that $\frac{dy}{dx} = y - x;\ y(0) = 2.$ **(4×3=12)**

SECTION – D

Answer **any 2** questions from among the questions **20** to **23.** These questions carry **5** marks **each.**

20. A fair coin is tossed three times. Let X equal 0 or 1 according as a head or a tail occurs on the first toss and let Y equal the total number of heads that occur.
    a) Find the distributions of X and Y.
    b) Find the joint distribution of X and Y.
    c) Determine whether X and Y are independent.
    d) Find Cov (X, Y).

21. Use Vogel's Approximation method to obtain an initial basic feasible solution of the following transportation problem :

	D	**E**	**F**	**G**	**Available**
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Demand	200	225	275	250	

22. From the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x = 1.6.

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

23. Given $y'' - xy' - y = 0; y(0) = 1, y'(0) = 0$, use Taylor's series method to determine y(0.1), correct to five decimal places. **(2×5=10)**
