(NO. OF PAGES: 3)

(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2023 ONLY)

24UCC2A1

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY - 2025

B.Com.-C.A **MAXIMUM MARKS: 75**

SEMESTER: II **TIME : 3 HOURS**

PART - III
BUSINESS MATHEMATICS

SECTION – A **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTION **(K1)**

1. Find the simple interest on Rs. 5,000 at 10% for 3 years_____.

   (a) Rs. 1500 (b) Rs. 1000 (c) Rs. 5000 (d) 3000

2. The present value of an immediate annuity is _____.

   (a) $V = \frac{A}{i}[1-(1+i)^{-n}] V = \frac{A}{i}[(1+i)^{-n}]$ (b) $V = \frac{A}{i}[1-(1+i)^{-n}]$

   (c) $V = \frac{A}{i}[2-(1+i)^{-n}]$ (d) $V = \frac{A}{i}$

3. If $\phi = \{x: x is a odd number, x is a even number\}$ then _____.

   (a) A is the set of all real numbers (c) A is an empty set

   (b) A is the set of all integers (d) A is a singleton set

4. A square matrix A is said to be orthogonal if _____.

   (a) $A = A'$ (b) $A\,A' = I$ (c) $A = A^2$ (d) $A^2 = 0$

5. Let A be a square matrix. A^{-1} exist if _____.

   (a) $|A| = 0$ (b) $|A| \neq 0$ (c) $A = A'$ (d) None of these

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES. **(K2)**

6. What is the effective rate of interest?
7. Write down the kinds of Annuities.
8. State the De Morgan's Laws for any two sets A and B.
9. Define: Non-singular Matrix.
10. Find the inverse of $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$.

SECTION – B **(5 X 5 = 25 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a) A man invested a certain sum of money at 10% simple interest. After one year he invested an equal amount at 12% simple interest. When the amount in each case became Rs. 1,600 he withdrew the money. How much money was invested in each case and after how many years the first one was withdrawn?

(OR)

b) On what sum of money will the difference between the simple interest and the compound interest for 2 years at 5% per annum be equal to Rs. 50 ?

(CONTD……2)

12.a) A sum of Rs. 1000 is to be paid at the end of every year for a period of 5 years at the rate of 10% per annum compound interest. If the first instalment is paid at the end of the first year, how much amount will be accrued to the credit of the depositor? What is its present worth?

(OR)

b) Mr. Guru acquired a plant delivered on January 1, 1990 on the following terms:
(i) Initial payment of Rs. 40,000 immediately and
(ii) 4 half-yearly instalments of Rs. 30,000 each commencing June 30, 1990.
Interest is 10% with yearly rests. What is the cash price?

13.a) If A={1, 2, 4, 6, 8}, B={2, 3, 4, 5, 6} and C={3, 6, 9, 12, 15}, find (i) $A \cap B$, (ii) $B \cap C$ and (iii) $C \cap A$. Also prove that $(A \cap B) \cap C = A \cap (B \cap C)$.

(OR)

b) Verify the distributive law $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$using Venn diagrams.

14. a) If $A = \begin{bmatrix} 3 & 5 \\ 2 & a \end{bmatrix}$, $B = \begin{bmatrix} 4 & b \\ 2 & 9 \end{bmatrix}$ and $C = \begin{bmatrix} 26 & a \\ 14 & 45 \end{bmatrix}$ find a and b when 2A+5B = C.

(OR)

b) Find the value of the determinant |A| and A' when $A = \begin{bmatrix} 3 & 4 & 7 \\ 2 & 1 & 3 \\ 7 & 2 & 1 \end{bmatrix}$.

15.a) Show that $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ satisfies the equation $A^2 - 4A - 5I = 0$ where I is the identity matric and 0 denotes the zero matrix. Hence find the inverse of A.

(OR)

b) Find the rank of A, where $A = \begin{bmatrix} 1 & -2 & 0 & 1 \\ 2 & -1 & 1 & 0 \\ 3 & -3 & 1 & 1 \\ -1 & -1 & -1 & 1 \end{bmatrix}$.

SECTION – C (5 X 8 = 40 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K4 (Or) K5)

16. a) (i) The simple interest on a certain principal for 5 years is Rs. 360 and the interest is 9/25 of the principal. Find the principal and the interest rate. (4 marks)

(ii) A borrowed a sum of Rs. 3,150 from B and agreed to repay the sum in ten monthly instalments of Rs. 315 each and the interest at the rate of 10% per annum in the 11^{th} instalment. Calculate the simple interest that A paid to B. (4 marks)

(OR)

b) (i) A loan is repaid in 4 annual instalments of Rs. 200 each. If the rate of interest is 10% p.a find the amount of the loan. (3 marks)

(ii) Find the effective rate of interest per cent per annum equivalent to a normal rate of 12% per annum, the interest being payable half-yearly. (5 marks)

17. a) (i) Mr. X borrows Rs. 1,716. He repays Rs.250 at the end of each year. In how many years can he clear the debt if the rate of compound interest is 7.5% p.a.? (5 marks)
(ii) What do you mean by banker's discount? (3 marks)

(OR)

b) A bill for Rs. 1,825 was drawn on 22^{nd} January at 6 months date and discounted on 16^{th} April at the rate of 10% per annum. Find the sum for which the bill was discounted and the banker's gain.

(CONTD……..3)

18. a) (i) If A = {1, 2, 3, 4}, B = {2, 4, 5, 6} and C = {1, 3, 5}, verify that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$. (4 marks)

(ii) If A = {1, 2, 3, 4}, B = {3, 4, 5, 6} and C = {1, 5, 6, 7, 8}, verify that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. (4 marks)

(OR)

b) If A, B and C are any three sets, prove that $A - (B \cap C) = (A - B) \cup (A - C)$ by using Venn diagrams.

19.a) Two shops A and B have in stock the following types of radios:

	Single Band	Two Band	Three Bond
Shop A	23	20	15
Shop B	40	10	8

Shop A places order for 40 single band, 40 two band and 20 three bond radios whereas shop B orders 26, 30, 20 numbers of the three varieties. Due to various factors, they receive only half of the order as supplied by the manufacturers. The cost of the three types of the radios are Rs. 100, Rs. 220 and Rs. 300 respectively. Represent the following as matrices:

(i) the initial stock
(ii) the order
(iii) the supply
(iv) final stock
(v) cost of individual items (column matrix) and
(vi) total cost of stock in the shops.

(OR)

b) Solve the following system of simultaneous equations by Cramer's Rule:

$$2x + 3y + 3z = 22,\ x - y + z = 4,\ 4x + 2y - z = 9.$$

20.a) Find the rank of A, B, A+B and AB where $A = \begin{bmatrix} 1 & 1 & -1 \\ 2 & -3 & 4 \\ 3 & -2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & -2 & -1 \\ 6 & 12 & 6 \\ 5 & 10 & 5 \end{bmatrix}$.

(OR)

b) Test for consistency and solve, if consistent:

4x +3y +2z +7 = 0, 2x + y – 4z + 1 = 0, x - 7y -2 = 0.

****

ETHICAL PAPER