



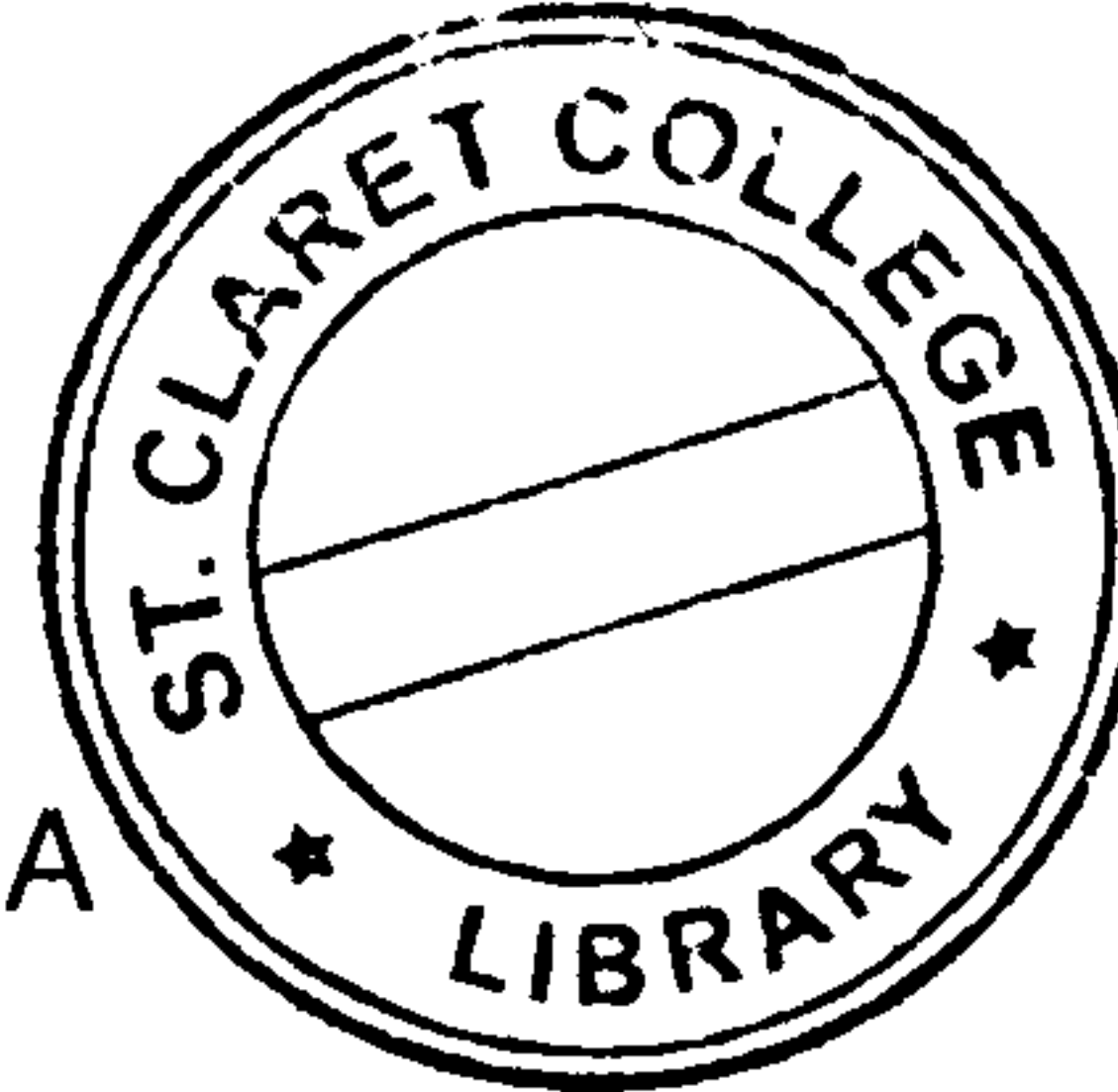
UN – 312

- 17 -

I Semester B.C.A. Degree Examination, November/December 2015
(CBCS) (Y2K14 Scheme)
BCA – 105 T : DISCRETE MATHEMATICS

Time : 3 Hours

Max. Marks : 100

Instruction : Answer all Sections.

SECTION – A

I. Answer any ten :

(10×2=20)

1) If $A = \{2, 3, 4, 8\}$, $B = \{1, 3, 4\}$ and $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$.Verify $A - B = A \cap \bar{B}$.2) If $A = \{2, 3, 5\}$, $B = \{4, 5, 6\}$ and $C = \{1, 2\}$ find $A \times B$.

3) Define Tautology.

4) Define diagonal matrix.

5) If $2Y + \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$, find Y .

6) State Cayley Hamilton theorem.

7) If $\log_7 x + \log_7 x^2 + \log_7 x^3 = 6$, find x .

8) Define combination.

9) Define Abelian group.

10) If $\vec{a} = 2i + 3j - 4k$, $\vec{b} = 3i - 4j - 5k$ find $|\vec{a} + \vec{b}|$.11) Find the distance between the point, $A = (-7, 4)$ and $B = (-5, -1)$.

12) Find the equation of the line with slope 2 and cutting off an intercept 3 on Y-axis.

P.T.O.



SECTION - B

II. Answer **any six** of the following :

(6×5=30)

13) If $A = \{a, b, c, d\}$, $B = \{c, d\}$ and $C = \{d, e\}$ find $A - B$, $(A - B) \cap (B - C)$, $B \times C$.

14) If $f: \mathbb{R} \rightarrow \mathbb{R}$ is defined by $f(x) = 2x + 5$, prove that f is one-one and onto.

15) Prove that $(p \wedge q) \wedge \sim (p \vee q)$ is a contradiction.

16) Write the converse, inverse and contra positive of
"If I work hard then I get a grade".

17) Find the truth values of the propositions p , q and r , if the compound proposition $(p \rightarrow \sim q) \rightarrow r$ is false.

18) If $2A + B = \begin{bmatrix} 4 & 4 & 7 \\ 7 & 3 & 4 \end{bmatrix}$, $A - 2B = \begin{bmatrix} -3 & 2 & 1 \\ 1 & -1 & 2 \end{bmatrix}$ then find A and B .

19) If $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$, find A^{-2} using Cayley Hamilton theorem.

20) Solve the equations $5x + 2y = 4$, $7x + 3y = 5$ using Matrix method.

SECTION - C

III. Answer **any six** of the following :

(6×5=30)

21) If $\log\left(\frac{a+b}{2}\right) = \frac{1}{2}(\log a + \log b)$, show that $a = b$.

22) In how many ways the letters of the word "EVALUATE" be arranged so that all vowels are together.

23) If ${}^{15}C_{r+3} = {}^{15}C_{2r-3}$, find r .

24) If $G = \{3^n : n \in \mathbb{Z}\}$, prove that G is an abelian group under multiplication.

25) Prove that $G = \{1, 5, 7, 11\}$ is a group under multiplication modulo 12.

26) Find the value of λ for which the vectors $\vec{a} = 3i + j - 2k$ and $\vec{b} = i + \lambda j - 3k$ are perpendicular to each other.

27) Find the area of the triangle whose vertices are $A(1, 2, 3)$, $B(2, 5, 1)$ and $C(-1, 1, 2)$ using vector method.

28) If the vectors $2i - 3j + mk$, $2i + j - k$ and $6i - j + 2k$ are coplanar, find m .



SECTION - D

IV. Answer **any four** of the following :

(4×5=20)

- 29) Show that the points (3, 2), (0, 5), (-3, 2) and (0, -1) are the vertices of a square.
- 30) Find the ratio in which the x-axis divides the line segment joining the points (7, -3) and (5, 2).
- 31) Find the equation of the locus of a point which moves such that the sum of the squares of the distance from (a, 0) and (-a, 0) is $2C^2$.
- 32) Find the equation of the line whose x-intercept is 'a' and y-intercept is b.
- 33) If the line $2x - 5y + 1 = 0$ is perpendicular to $(p + 1)x + (2p + 3)y + 3 = 0$, find p.
- 34) Find the equation of the line passing through the point of intersection of $2x + 3y - 1 = 0$ and $3x + 4y - 6 = 0$ and parallel to the line $5x - y = 0$.
-