(b) Determine the number of triangles that can be formed by selecting from a set of 15 points out of which I are collinear.

8. Define the following with suitable examples :

(i) Composition of relations

(ii) Combinatorial arguments.

2354

B.C.A. (First Year)/

Diploma in Computer Application

EXAMINATION

(New Scheme)

BCA/DCA-104

MATHEMATICAL FOUNDATION OF

COMPUTER SCIENCE

Time : Three Hours   *Maximum Marks : 70*

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Define identity and square matrix with suitable examples :

   (b) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 4 \\ 1 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$. If

   A' denotes the transpose of the matrix A, verify that $(AB)' = B'A'$.

2. Find the inverse of the matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$

 where $ad - bc \neq 0$

3. (a) Define finite set and empty set with suitable examples.

 (b) Let $A = \{x : x^3 + 1 = 0\}$, $B = \{x : x^2 - x + 1 = 0\}$. Find $A \cap B$ when x is real and when x is not real.

4. (a) Let $R = \{1, 2, 3\}$ and $S = \{4, 5, 6\}$. Determine the Cartesian product.

 (b) Determine Finite set and Infinite set among the following :

 (i) $K = \{$cities in India$\}$

 (ii) $L = \{$members of the Parliament$\}$

 (iii) $D = \{x : x$ is a multiple of 3 and 5$\}$

5. (a) Let f, g be the functions from n to n, where n is the set of the natural numbers so that :

$$f(n) = (n + 1)$$
$$g(n) = 2n$$
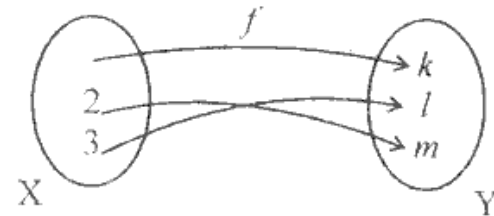
 Determine the composite functions :

 (i) fof

 (ii) gof

 (b) If A has m elements and B has n elements, how many functions are there from A to B and from B to A.

6. Define the following with respect to :

 (i) Surjective functions

 (ii) Consider $X = \{1, 2, 3\}$, $Y = \{k, l, m\}$ and $f : X \rightarrow Y$ such that $f = \{(1, k), (2, m), (3, l)\}$ as in the given figure.

 Find the inverse of f.

7. (a) How many ways can be select a software development group of 1 project leader, 5 programmers and 6 data entry operators from a group of 5 project leaders, 20 programmers and 25 data entry operators.