

# PC-11773/NJ

D-3/2111

DISCRETE MATHEMATICS – 353

Semester–V

Time : Three Hours]

[Maximum Marks : 45

**Note :** Attempt *two* questions each from Section A and B, Section–C will be compulsory. Each question of Section–A and B carries 6 marks. Sections-C consists of 7 short answer type questions carries 3 marks each.

## SECTION – A

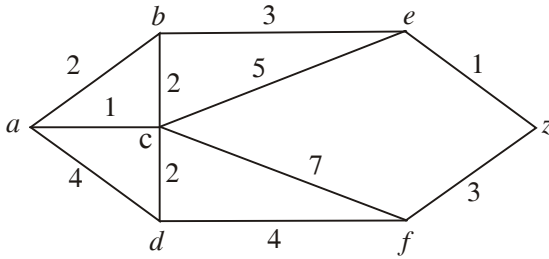
I. Use Mathematical Induction to show that

$$1 + 2 + 4 + \dots 2^n = 2^{n+1} - 1.$$

II. In a class of 60 boys, there are 45 boys who play cards and 30 boys play carrom. Find :

- (a) How many boys play both games?
- (b) How many boys play cards only?
- (c) How many boys play carrom only?

III. Find the shortest path between  $a$  and  $z$ .



IV. Show that the maximum number of edges in a simple graph

with  $n$  vertices is  $\frac{n(n-1)}{2}$ .

### SECTION – B

V. Solve  $S_n - 4S_{n-1} + 4S_{n-2} = 3n + 2^n$  with  $S_0 = S_1 = 1$ .

VI. Which sequence has the generating function  $\frac{1}{1-z-z^2}$ ?

VII. State and Prove De-Morgan's Law in a Boolean algebra.

VIII. Prove that product of two lattices is a lattice.

### SECTION – C

IX. (a) Define Lattice with an example.

(b) What do you mean by Boolean function.

- (c) Define symmetric relation with an example.
  - (d) Define planar graph with an example.
  - (e) What do you mean by weighted graph?
  - (f) State Pigeonhole principle.
  - (g) How many relations are possible from a set  $A$  of  $m$  elements to another set  $B$  of  $n$  element? Why?  
(7×3=21)
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