

$$a_r = \begin{cases} 1 & 0 \leq r \leq 9 \\ 2 & r \leq 10 \end{cases} \quad 5$$

- (b) Consider $H_0=0$, $H_1=1$ and $H_n=H_{n-1}+2H_{n-2}$.
Give an explicit solution for H_n . 5

7. (a) Draw a directed graph of the following relations R defined on the set $\{1, 2, 3, 4\}$. Decide whether the relation is reflexive, symmetric, or transitive.

$$R = \{1, 1\}, \{2, 2\}, \{3, 3\}, \{4, 4\}, \{1, 2\}, \{2, 3\}, \{1, 3\}, \{3, 2\} \quad 5$$

- (b) Let f be the function from the set $X = \{2, 3, 4, 5, 6, 7\}$ into the set $Y = \{0, 1, 2, 3, 4\}$ defined by $f(x) = 2x \pmod{5}$. Write f as a set of ordered pairs. Is f one-one or onto Y ? 5

This question paper contains 6 printed pages.

Your Roll No.

Sl. No. of Ques. Paper : 6511

22/05/18

Unique Paper Code : 32341202

Name of Paper : Discrete Structures

(morning)

Name of Course : B.Sc. (Hons.) Computer Science

Semester : II

Duration : 3 hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory in Section A.

Attempt any four questions from Section B.

Parts of a question should be attempted together.

SECTION A

1. (a) Of a group of 20 students, 10 are interested in music, 7 are interested in photography, and 4 like swimming. Furthermore 4 are interested in both music and photography, 3 are interested in both music and swimming, 2 are interested in both photography and swimming and 1 is interested in music, photography and swimming. How many students are interested in photography but not in music and swimming? 3
- (b) Prove that the given Boolean expression is a tautology using equivalence rules:
 $(\neg p \wedge q) \rightarrow (\neg (q \rightarrow p))$ 5

(c) Given $f(x)=x^2+1$ and $g(x)=x+2$. Find $f \circ g$ and $g \circ f$ where f and g are functions from \mathbb{R} to \mathbb{R} . 3

(d) Consider the following advertisement of a game:

(i) There are three statements in this advertisement.

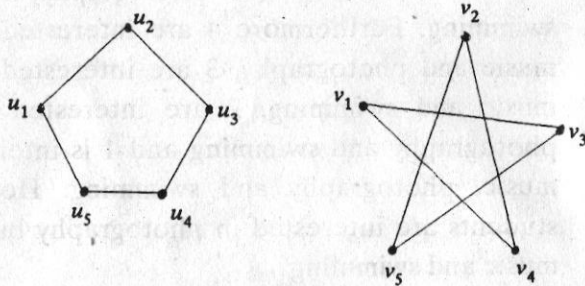
(ii) Two of them are not true.

(iii) The average increase in IQ scores of people who learned this game is more than 20 points.

Prove that the statement (iii) is true using truth table. 4

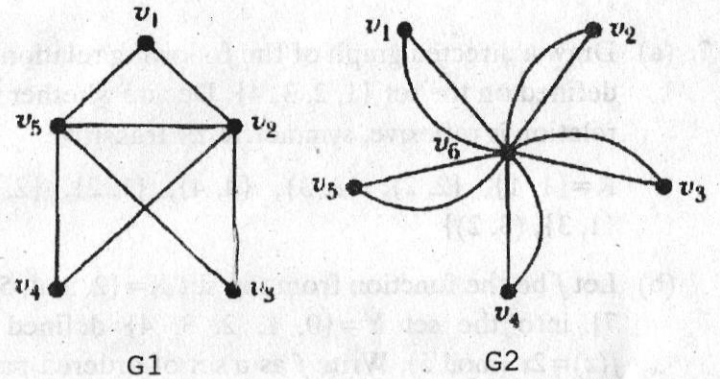
(e) A dance pair means a woman and man dancing together. How many such dance pairs can be formed from a group of 6 women and 10 men? 3

(f) Determine whether the given graphs G_1 and G_2 are isomorphic or not. 4

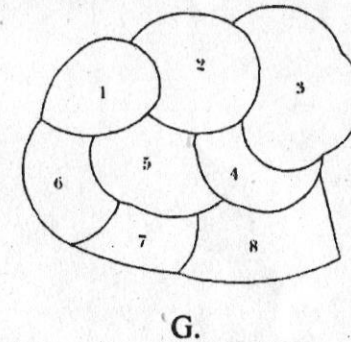


(g) Does there exist a simple graph with seven vertices having following given degree sequence:
(1, 3, 3, 4, 5, 6, 6) 3

(b) State the condition for Eulerian path and Eulerian circuit. Determine whether the given graphs G_1 and G_2 have Eulerian circuit or Eulerian path. 4



(c) Define chromatic number for a graph. Determine χ (chi) for the given graph G . 2



6. (a) Find $S^6 a$ and $S^{-3} a$ for the following numeric function where r is 0 for $r=0, 1, 2, i-1$ and is a_{r-i} for $r \geq i$: