NEP-24-2 / 01MSCCS04.2 - Paper-IV - Elective-II : Discrete Mathematics

P. Pages : 3   GUG/W/23/15082

Time : Three Hours   *8009*   Max. Marks : 80

_____

Notes : 1.   All questions are compulsory and carry equal marks.
        2.   Draw neat and labelled diagram and use supporting data whenever necessary.
        3.   Avoid vague answer and write specific answer related to questions.

Either:

1.   a)   What is statement? Explain its subtypes.   **8**

     b)   Construct the truth table for following.   **8**

         i) $(A \oplus B) \oplus C$

         ii) $(A \uparrow B) \uparrow C$

OR

     c)   Prove that   **8**

         i) $\overline{(A \cap B)} = \bar{A} \cup \bar{B}$

         ii) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

     d)   Prove the given statement is tautology.   **8**
        $(p \rightarrow q) \leftrightarrow (\sim q \rightarrow \sim p)$

Either:

2.   a)   Explain pigeonhole principle with example.   **8**

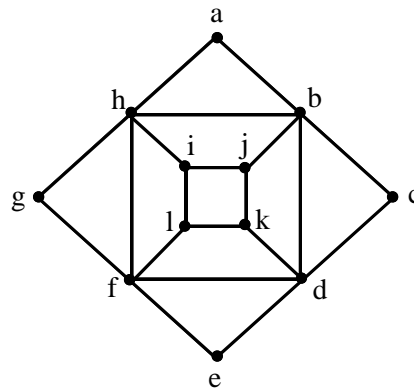   b)   What is function? Explain its types.   **8**

OR

     c)   Prove   **8**
        $p(n,r) = p(n-1,r) + r.p(n-1,r-1)$

     d)   Determine the value of n if   **8**
        $6x^n p_3 = 3x^{n+1} p_3$

Either:

3.   a)   Explain Kruskal's algorithm to find the minimum spanning tree.   **8**

b) Find the spanning tree for the following. **8**

OR

c) Explain following with example **8**

i) Euler path and circuit   ii) Hamiltonian path & circuit

d) prove **8**

i) $a \oplus (a * b) = a$ or $a * (a \oplus b) = a$

ii) $(a * b) + (a * c) \le a * [b \oplus (a * c)]$

Either:

4. a) Explain the following properties of Binary operations. **8**

i) Closure property   ii) Associative property.

b) Let $G = (V, S, V_0, | \rightarrow)$ **8**

$V = \{V_0, a\}$

$S = \{a\}$

$| \rightarrow : Vo | \rightarrow aaVo$

$Vo | \rightarrow aa$
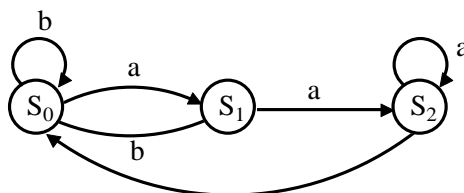
find $L(G)$

OR

c) The finite state machine where diagraph is given below **8**

i) List the value of the transition function $f\omega$ for $\omega = abba$

ii) Describe the set of words ω having the property that $F\omega(S_0) = S_2$

d) Describe the language accepted by the Moore machine whose state table is given as the starting state is S_0 and set T of acceptance state is shown. **8**

	0	1
S_0	S_1	S_0
S_1	S_1	S_2
S_2	S_1	S_0

5. Attempt all the questions.

a) Prove that the statement is true by using mathematical induction. **4**

$$1+3+5+-----+2_{n-1} = n^2$$

b) Let A = R, consider the following relation R on A, aRb if and only if $a^2 + b^2 = 25$ find Dom (R) & Ran (R). **4**

c) Define **4**

   i) Graph   ii) Digraph

   iii) Mixed graph   iv) Null Graph

d) What is monoid? Explain with example. **4**

******