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II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

Second Semester

AM / CS / CYS / DS

DISCRETE MATHEMATICS

Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit.

All Questions carry equal marks. **5x14=70 M**

UNIT - I

1. a) Construct the truth table for the formula $[(p \vee q) \wedge (\neg r)] \leftrightarrow q$.

   b) Write the converse, inverse and contrapositive of the following

   "If today is a holiday then I will go for a movie".

(OR)

2. a) Explain the connectives with example each.

   b) Prove that by mathematical induction $6^{n+2} + 7^{2n+1}$ is disible by 43.

UNIT - II

3. a) Show that r v s follows logical from the premises $c \vee d$, $(c \vee d) \rightarrow \neg h$, $\neg h \rightarrow (a \wedge \neg b)$ and $(a \wedge \neg b) \rightarrow (r \vee s)$.

   b) Symbolize the following argument and check for it validity :

   Lions are dangerous animals.

   There are lions.

   Therefore, there are dangerous animals.

(OR)

4. a) Use mathematical induction to prove that $1^3 + 2^3 + 3^3 + - - - - + n^3 = \frac{n^2 (n+1)^2}{4}$.

   b) "If there was a ball game, then travelling was difficult. If they arrived on time, then travelling was not difficult. They arrived on time. Therefore, there was no ball game". Show that these constitute a valid argument.

P.T.O.

UNIT - III

5. a) Define relation. Write the properties of relation with one example each.

   b) Solve the recurrence relation $a_{n+1} - a_n = 3^n$, $n \geq 0$ and $a_0=1$ by generating function method.

(OR)

6. a) Let X = {1,2,3,4,5,6,7} and R = {(x,y) / x-y is disible by 3}. Show that R is an equivalence relation. Draw the graph of R.

   b) Solve the recurrence relation $a_n + a_{n-1} - 8a_{n-2} - 12a_{n-3} = 0$, $n \geq 3$ with $a_0 = 1$, $a_1 = 5$, $a_3 = 1$.

UNIT - IV

7. a) Define Lattice. Show that $\{D_{42}, /\}$ is a lattice.

   b) Define the following terms and draw the one example each.

   (i) Regular graph (ii) Complete Bipartite graph (iii) Complete graph.

(OR)

8. a) Define Hasse diagram. Draw the Hasse diagram for the poset $\{P(S), \subset\}$ where S={1,2,3}.

   b) Using Warshalls algorithm compute the adjacency matrix of the transitive closure of the digraph G = {a,b,c,d,e} and edges are {(a,b), (b,c), (c,d), (d,e), (e,d)}.

UNIT - V

9. a) Define Isomorphic ? Check the following two digraphs are Isomorphic or not ?

   G_1 = {(a,b), (a,c), (b,a), (b,c), (c,b), (c,d), (d,a), (d,c)}

   G_2 = {(a,c), (a,d), (b,c), (b,d), (c,a), (c,b), (d,a), (d,b)}

   b) Define (i) Euler graph (ii) Hamiltonian graph write one example each.

(OR)

10. a) State and prove Euler's formula for Planar graph.

    b) Every simple planar graph is 5 - colourable.