JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test - 2 Examination April 2024

B.Sc. (Maths & Computing) II Semester/B.Tech. IV Semester (ECE)

COURSE CODE(CREDITS): 22BS1MA211/ 18B11MA413 (3) MAX. MARKS: 25

COURSE NAME: Discrete Mathematical Structures/Discrete Mathematics

COURSE INSTRUCTOR: Dr R K Bajaj* MAX. TIME: 1.5 Hrs

Note: (a)*All questions are compulsory. (b)Marks are indicated against each question in square brackets. (c) The candidate is allowed to make suitable numeric assumptions wherever required.*

1. Using the notion of generating function, solve the recurrence $a_k = 8a_{k-1} + 10^{k-1}$ with initial condition $a_0 = 1$. (4) [CO-1]

2. Using truth table, check the validity of the following argument: (4) [CO-2]
If I go to school, then I attend all the classes. If I attend all the classes, then I get grade A. I do not get grade A and I do not feel happy. Therefore, if I do not go to school then I do not feel happy.

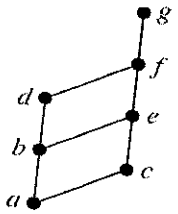
3. (a) Write the negation of "*All States in India are densely populated.*" (1) [CO-2]
(b) Symbolize the statement using quantifiers & write the negation of "*Some tigers are white.*" (1) [CO-2]

4. Suppose that a and b are integers such that $a \equiv 11 \pmod{19}$ and $b \equiv 3 \pmod{19}$. (2) [CO-1]
Find the integer c with $0 \leq c \leq 18$ such that $c \equiv 13a \pmod{19}$.

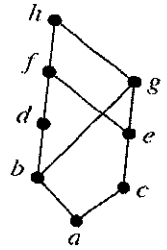
5. Find the smallest relation containing the relation {(1, 2), (1, 4), (3, 3), (4, 1)} that is
a) reflexive and transitive.
b) symmetric and transitive.
c) reflexive, symmetric, and transitive. (4) [CO-1]

6. Determine whether the posets with these Hasse diagrams are lattices: (3) [CO-2]

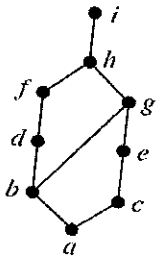
a)



b)



c)



7. Find the converse, inverse and contra-positive of the following statement: (3) [CO-2]

$$\left(\forall x \in A\ \exists y \in B,\ p(x,y) \wedge q(x,y)\right) \rightarrow \left(\exists x \in A\ \forall y \in B\ \ p(x,y) \rightarrow q(x,y)\right).$$

8. Explain the concept of cross partition and explain with the help of an example. (3) [CO-1]

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