R18

Code No: 154AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, April/May - 2023

DISCRETE MATHEMATICS

(Common to CSE, IT, ITE, CE(SE), CSE(CS), CSE(N))

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) Define Tautology with suitable example. [2]
b) Write contra positive of the conditional statement:
P: 2+2=4, q: I am not the Prime Minister of India. [3]
c) Define binary relation . [2]
d) If A={α,β}, B={1,2,3}. Find out (AxB) U (BxA) and (AxB) ∩ (BxA). [3]
e) What is recursive algorithm? [2]
f) Write the Principle of Mathematical Induction. [3]
g) Write Fibonacci Recurrence Relation. [2]
h) What is inclusion-exclusion? [3]
i) What is planar graph? [2]
j) Define shortest path algorithm. [3]

PART – B

(50 Marks)

2.a) Prove that $(\forall x)(P(x) \vee Q(x)) \Longrightarrow (x)P(x) \vee (\exists x)Q(x)$
b) Show that $r \wedge (p \vee q)$ is a a valid conclusion from the premises
$(p \vee q), (q \rightarrow r), (p \rightarrow m)$ *and* $(\sim m)$. [5+5]

OR

3.a) Verify the following argument is valid by translating into symbols and using rules of inference
If Clifton does not live in Franc, then he does not speak French
Clifton does not drive a Datsum
If Clifton lives in France, then he rides a bicycle
Either Clifton speaks French, or he drives a Datsun
Hence, Clifton rides a bicycle.
b) Show that $r \wedge (p \vee q)$ is a a valid conclusion from the premises
$(p \vee q), (q \rightarrow r), (p \rightarrow m)$ *and* $(\sim m)$. [5+5]

4. Show that congruence modulo m is an equivalence relation on integers. [10]

OR

5.a) If R is a relation on a set A, then R is transitive if and only if $R^2 \subseteq R$
b) Consider the following relation on$\{1,2,3,4,5,6\}$, $R = \{(i,j): |i-j| = 2\}$ Is R transitive? Is R reflexive? [5+5]

6.a) Suppose the postal department prints only 5 and 9 cent stamps. Prove that it is possible to make up any postage of n cents using only 5 and 9 cent stamps for $n \geq 35$.

b) Give a recursive definition of the: i) the set of even integers ii) the set of positive integers congruent to 2 modulo 3. iii) the set of positive integers not divisible by 5. [5+5]

OR

7.a) Give a recursive algorithm for finding the sum of the first n positive integers.

b) Use mathematical induction to prove that the statement [5+5]

$x - y$ is a factor of polynomial $x^n - y^n$

8. Solve the recurrence relation of the Fibonacci series of numbers. [10]

OR

9. Use generating functions to solve the recurrence relations

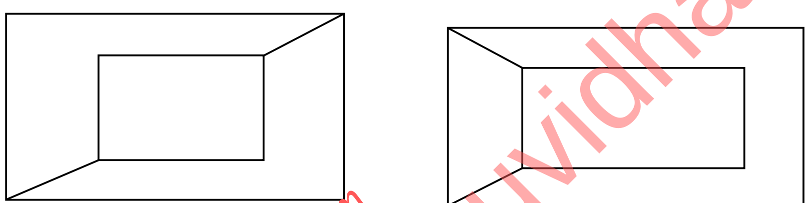
$a_r = a_{r-1} + a_{r-2}$ with $a_1 = 2$ and $a_2 = 3$ [10]

10.a) Show that a graph K_n has a Hamiltonian cycle whenever $n \geq 3$.

b) Show that K_5 is an Euler's circuit and also Hamiltonian cycle. [5+5]

OR

11. Verify whether the graphs G and G1 are isomorphic or not. Explain the reason. [10]



G G1

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