Code No: 133BC **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, December - 2019
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE, IT)

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

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

1.a) Define a statement and give an example. [2]
b) Explain Connectives with suitable example. [3]
c) What is an Algebraic Structure and give an example. [2]
d) Differentiate between Binary relation and equivalence relation. [3]
e) Compare between Combinations and Permutations with appropriate example. [2]
f) What is the Principle of Inclusion Exclusion in elementary Combinatorics. [3]
g) What is recurrence relation and give an example? [2]
h) Find the coefficient for the generating function $2^1, 2^2, 2^3, 2^4 \ldots$. [3]
i) Define Isomorphism in Graphs with suitable example. [2]
j) Briefly write about Trees Properties. [3]

PART-B

(50 Marks)

2.a) Identify the converse, inverse and contra positive for the Proposition $P \rightarrow Q$.
b) Find DNF of $P \rightarrow ((P \rightarrow Q) \wedge \sim (\sim Q \vee \sim P))$ [5+5]

OR

3.a) Differentiate between PDNF and PCNF with two examples.
b) Identify whether $(P \vee Q) \vee \sim R$ is a tautology or not. [5+5]

4.a) Define Lattice and explain its properties.
b) If a, b are any two elements of a group (G, .) which commute, show that a^{-1} and b commute, b^{-1} and a commute, a^{-1} and b^{-1} commute. [5+5]

OR

5.a) Define abelian group with example.
b) Construct the Hasse diagram for the divisibility relation A = {3, 6, 12, 36, 72}. [5+5]

6.a) Predict that in how many ways two slices of pizza can be chosen from a plate containing one slice each of pepperoni, sausage, mushroom, and cheese pizza?
b) If a person having 4 trousers and 3 shirts, then identify the number of ways of selecting a pair? [5+5]

OR

7.a) How many ways are there to place 20 identical balls into 6 different boxes in which exactly 2 boxes are empty?
b) State and explain Binomial theorem with an example. [5+5]

8.a) Solve the recurrence relation $a_n-6a_{n-1}+8a_{n-2}=9$, $n>=2$,$a_0=10$, $a_1=25$ by using generating function?

b) Solve the recurrence relation $a_n-a_{n-1}+16a_{n-2}+34a_{n-3}=1$, $n>=2$, $a_0=0$, $a_1=2$, $a_2=6$. [5+5]

OR

9.a) Solve the recurrence relation $a_n-2a_{n-1}+8a_{n-2}=0$ $n>=2$,$a_0=5$, $a_1=31$.

b) Solve the recurrence relation $a_{n+1}=8a_n$, $n>=0$ where $a_0=4$. [5+5]

10.a) Discuss and differentiate between Euler graph and Euler Circuits.

b) Briefly discuss about spanning Trees with appropriate illustration. [5+5]

OR

11.a) Differentiate between Hamiltonian Graphs and Euler circuits.

b) Write applications of graph theory. [5+5]

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