Code No:841AA **R17**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, April/May - 2019
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Time: 3hrs **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

5 × 5 Marks = 25

1.a) Construct the truth table $(P \wedge Q) \vee (Q \wedge R) \vee (P \wedge \sim R)$. [5]

b) Let G be the set of real numbers not equal to-1 and be defined by $a*b=a+b+ab$. *Prove that* $< G,* >$ *is an abelian group.* [5]

c) How many integers between 1 and 100 have a sum of digits of integer numbers equal to 10? [5]

d) Find the particular solution for the following difference equation $a_n+5a_{n-1}+6a_{n-2}=42.4^n$ [5]

e) What do you mean by Isomorphic graph? When will you say that two graphs are isomorphic? [5]

PART - B

5 × 10 Marks = 50

2. Obtain the Principal Disjunctive normal form of
$P \rightarrow [(P \rightarrow Q) \wedge \sim(\sim Q \vee \sim P)]$ [10]

OR

3. Show that the following *argument is valid*. If today is Tuesday, I have a test in Mathematics or Economics. If my Economics professor is sick, I will not have a test in Economics. Today is Tuesday and my Economics professor is sick. Therefore I have a test in Mathematics. [10]

4. Consider the group G = {1,2,4,7,8,11,13,14} under multiplication modulo 15. Construct the multiplication table of G and verify whether G is cycle or not. [10]

OR

5.a) Let f: R→R and g: R→R, where R is the set of real numbers. Find fog and gof, where $f(x) = x^2-2$ and $g(x) = x+4$. State whether these functions are injective, surjective, and bijective.

b) Define Lattice and write various properties of Lattice. [5+5]

6. Using binomial identities evaluate the sum1.2.3+2.3.4+……+(n-2)(n-1)n. [10]

OR

7. Suppose there are 15 red balls and 5 white balls. Assume that the balls are distinguishable and that a sample of 5 balls is to be selected.
a) How many samples of 5 balls are there?
b) How many samples contain all red balls?
c) How many samples contain 3 red balls and 2 white balls?
d) How many samples contain at least 4 red balls? [10]

8. Solve the recurrence relation $a_n-7a_{n-1}+10a_{n-2}=0$ for $n\geq 2$ where $a_0=10$ and $a_1=41$. [10]

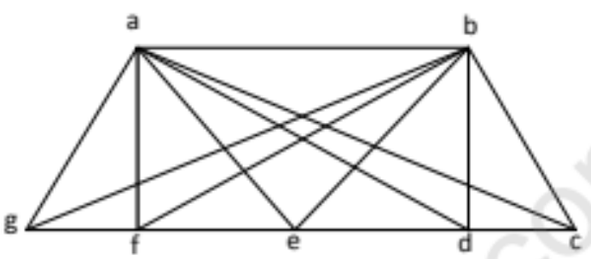
OR

9. Explain and illustrate various ways of solving the recurrence relation. [10]

10. State and explain the 4-color problem for planar graphs. [10]

OR

11. What is planar graph? Show that following graph is planar. [10]



---ooOoo---