1.a) Construct the truth table $(P \land Q) \lor (Q \land R) \lor (P \land \neg R)$.

- Let G be the set of real numbers not equal to-1 and be defined by $a^*b=a+b+ab$. b) *Prove that* $\langle G, * \rangle$ *is an abelian group.* [5]
- How many integers between 1 and 100 have a sum of digits of integer numbers equal to c) 10? [5]
- Find the particular solution for the following difference equation $a_n+5a_{n-1}+6a_{n-2}=42.4^n$ d)
- What do you mean by Isomorphic graph? When will you say that two graphs are e) isomorphic? [5]

PART - B

Obtain the Principal Disjunctive normal form of 2. $P \rightarrow [(P \rightarrow Q) \land \sim (\sim Q \lor \sim P)]$

OR

- Show that the following argument is valid. If today is Tuesday, I have a test in 3. 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]
- Consider the group $G = \{1, 2, 4, 7, 8, 11, 13, 14\}$ under multiplication modulo 15. Construct 4. the multiplication table of G and verify whether G is cycle or not. [10]

OR

- Let f: $R \rightarrow R$ and g: $R \rightarrow R$, where R is the set of real numbers. Find fog and gof, where 5.a) $f(x) = x^2 - 2$ and g(x) = x + 4. State whether these functions are injective, surjective, and bijective.
- Define Lattice and write various properties of Lattice. b) [5+5]
- 6. Using binomial identities evaluate the sum $1.2.3+2.3.4+\ldots+(n-2)(n-1)n$. [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?

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

MCA I Semester Examinations, April/May - 2019

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Time: 3hrs

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

[5]

[5]

- 5×10 Marks = 50
 - [10]

[10]



Max.Marks:75

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- 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]

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





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