R15

Code No: 821AA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
MCA I Semester Examinations, January – 2018
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) What are rules of the Well Formed Formulas? [5]
b) Explain Abelian group with example. [5]
c) State and prove binomial theorem. [5]
d) Explain generating function. [5]
e) When two graphs are said to be isomorphic? Explain with an example. [5]

PART - B

5 × 10 Marks = 50

2. Derive the following using CP rule if necessary
$P \rightarrow (Q \rightarrow R), Q \rightarrow (R \rightarrow S) \Rightarrow P \rightarrow (Q \rightarrow S)$ [10]

OR

3. Explain in detail about the Logical Connectives with Examples. [10]

4. Draw the Hasse diagram of $(p(S), \leq)$, Where p(S) is power set of the set S= {a,b,c}.[10]

OR

5. Define a semi group and Monoid. Give an example of a Monoid which is not a group. Justify your answer. [10]

6. State and prove principle of inclusion and exclusion of three variables. [10]

OR

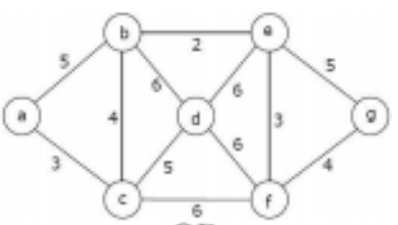
7. Answer the following:
a) In how many ways can six men and four women sit in a row?
b) In how many ways can they sit in a row if all the men sit together?
c) In how many ways can they sit in a row if just the women sit together?
d) In how many ways can they sit in a row if men sit together? [10]

8. Find the particular solution of the recurrence relation $a_{n+2} - 4\,a_{n+1} + 4\,a_n = 2^n$? [10]

OR

9. Solve the recurrence relation $a_r - 5a_{r-1} = 3, r \geq 1$ with the boundary conditions a_0=1 using generating functions. [10]

10. Write the Kruskal's algorithm and find minimal spanning tree of the weighted graph shown below. [10]



OR

11.a) A complete binary tree has 25 leaves. How many vertices does it have?

b) Explain about the following

i) Eulerian Graph

ii) Chromatic number. [10]

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