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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]
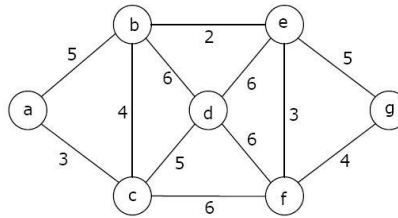
OR

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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