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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (I.T.) II Year I-Semester Backlog Examinations, December-2017

Discrete Mathematics

Time: 3 hours Max. Marks: 70

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

1. Define Tautology, Contradiction and Contingency.
2. Write the Converse and Contrapositive of " If it snows tonight then I will stay at home".
3. Compute 3071001 *mod* 102.
4. If a | b then prove that a | (b + c), where a, b and c are integers.
5. Explain Fibonacci relation.
6. Determine the coefficient of $x^{12}y^{13}$in the expansion of $(2x - 3y)^{25}$?
7. Define equivalence order relation and give an example of it.
8. Define Transitive closure of a relation.
9. Explain Eulerian graph with example.
10. State the First theorem of graph theory.

Part-B (5 × 10 = 50 Marks)

11. a) Show that $([(p\wedge\sim q) \rightarrow r] \rightarrow [p \rightarrow (q\vee r)])$ is a tautology. [5]

    b) What is meant by proof by contradiction? Use it to prove $\sqrt{5}$ is irrational. [5]

12. a) Let p be a prime which does not divide the integer a, then show that $a^{p-1} = 1\ (mod\ p)$. [5]

    b) Find the greatest common divisor of 1071 and 462 and express it as the linear combination of these numbers. [5]

13. a) State and prove the generalized pigeon-hole priniciple. [5]

    b) Find all the solutions of the Recurrence Relation $a_n = 5a_{n-1} - 6a_{n-2} + 7^n$. [5]

14. a) Draw the Hasse diagram for the divisibility on the set {1,2,3,4,6,8,12}. Also determine the maximal and minimal elements of it. [5]

    b) Show that the relation $R = \{(a,b)/\ a \equiv b(mod\ m)\}$ is an equivalence Relation on the set of integers, where m is a positive integer greater than 1. [5]

15. a) State and prove Euler's Formula for planar graphs. [6]

    b) Define the chromatic number of a graph and what is the chromatic number of k_n. [4]

16. a) Use mathematical induction to show that $1 + 2 + 2^2 + \ldots\ldots\ldots\ldots + 2^n = 2^{n+1} - 1$ for all non-negative integers 'n'. [5]

    b) If $a = bq + r$ then prove that $\gcd(a,b) = gcd(b,r)$, where a, b, q & r are integers. [5]

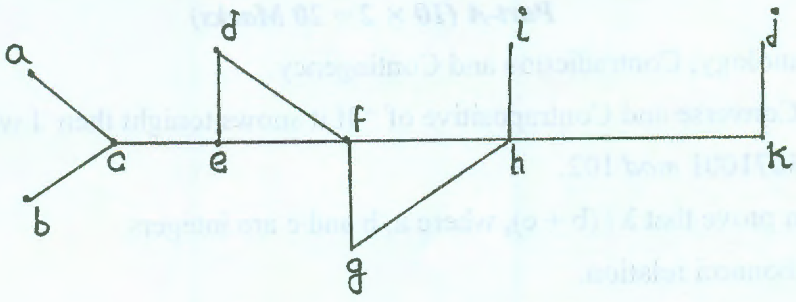
Contd... 2

17. Answer any *two* of the following:

a) How many solutions are there to the equation $x_1 + x_2 + \cdots + x_5 = 21$ where x_i is a non- negative integer and $i = 1,2,3,4,5$ such that $x_i \geq 2$ for all i. [5]

b) Define greatest and least elements of a poset. Is there a greatest and least element in the poset $(Z^+, /)$? [5]

c) Use a depth first search to find a spanning tree for the graph given below: [5]



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