Nepal College of Information Technology

**Unit Test**

Fall 2012

Program : BE IT Time : 2 hrs

Semester : (I) FM : 70

Subject : Problem Solving Techniques PM : 35

* *Candidates are requested to give their answer as far as practicable in their own words.*
* *The figure in the margin indicates the full marks*
* ***Attempt ALL question***

1. a) Determine how many zeros end the number 100! + 215 X 510 . 5

b) What is the last digit of 765221. 5

c) Prove by induction. 1+2+3+4-------+n= n(n+1)/2. 5

d) Suppose you are told in advance that 10 of the cattle present are lame, and only have three feet. But the count yields 120 heads and 300 feet. How many cattle and how many people are there? 5

2. a) Prove the law of sines: if Δ ABC is a triangle, then 7



b) Consider a polyhedron with 5 triangular faces meeting at each vertex. How many faces, vertices and edges will it have? Also explain why it is impossible to have a polyhedron with 6 triangular faces meeting at each vertex. 8.

c) A Circle of radius is inscribed in an equilateral triangle of suitable size. Then three more circles are inscribed between the first circle and the two sides of the triangle near each vertex. The process continues indefinitely, with progressively smaller circles. What is the sum of the radii of all the circles? 5

3. a) A ten foot pole is dropped into a milling saw and randomly cut into three poles. What is the probability that these three pieces will form a triangle. 5

b) Draw a planar grid that is 7 squares wide and 12 square high. How many different non-trivial rectangles can be drawn, using the lines of the grid to determine the boundaries? 5

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c) We wish to bring from the river 1 quart of water, but we only have a 8 quart container and a 5 quart container and no other containers. How do we do? 5

d) Examine the equations.









Determine the pattern and prove the identity. 5

4. Write short notes on (Any two) 2X5

a) Pythagorean Theorem.

b) Use of Problem Solving Techniques.

c) Prove by Mathematical Induction.

d) Use of logic in daily life