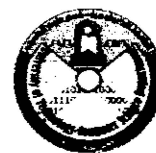




Computer Sciences
University of Technology



Date: 28/5/2015

Time: 3 hours

Lecturer Akbas E. & Zena R.

Final Exam. 2014-2015

First trail

Subject: discrete mathematics

Class: first

Branch: all

Note: Answer 6 questions only, 10 marks for each

Q1) Prove by induction:

$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6} \quad \text{for } n \geq 1$$

Q2) Consider the algebraic expression: $A/B^C + D \cdot E - A \cdot C$

1. Rewrite the expression into prefix polish notation form
2. Construct the corresponding ORT

Q3) Sketch the graph of the function $f(x) = x^2 + x - 6$ and Determine if each function is:
(a) onto, (b) one-to-one, (c) invertible?

Q4) Test the validity of the argument:

If the sky is cloudy then it rains

Either the sky is cloudy or it rains

Therefore the sky is clear or it is not raining

Where the sky is cloudy = p, and it is rain = q

Q5) Suppose that the input symbols = output symbols = $\{0,1\}$, design a FSM that will recognize the pattern 010 in the input string, (e.g : Input = 001001100010100)
Output = 000100000001010)

Q6) In a survey of 1000 college students, the following data were obtained:

595 had taken a Mathematics (M) course..

595 had taken a Computer science (C) course.

550 had taken a Business (B) course.

395 had taken both a Mathematics (M) and a Business course..

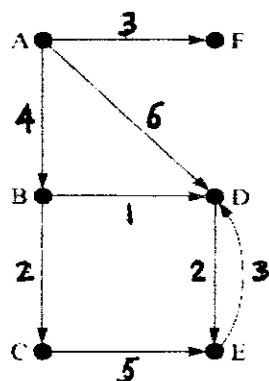
350 had taken both a Mathematics (M) and a Computer science (C) course

400 had taken both a Computer science (C) and a Business (B) course.

250 had taken all three courses.

(a) How many students were surveyed who had taken none of the three courses?

(b) Fill in the correct number of students in each of the eight regions of the Venn diagram.



Q7) Find minimum spanning tree and its weight for the following graph using Kruskal algorithm?

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