



**Computer Sciences
University of Technology**



Date: 16 /6/2016

Time: 3 hours

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**Final Exam. 2015-2016
first trail**

Subject: discreet mathematic
Class: first
Branch : all

Note :Answer 6 questions only , 10 marks for each

Q1) Sketch the graph of the function $f(x) = 2^x - x - 2$ and Determine if this function is:
(a) onto, (b) one-to-one, (c) invertible ? (Mention the reasons)

Q2) Prove by induction: $1 + 3 + 5 + \dots + (2n-1) = n^2$

Q3) In a survey of 100 college students, the following data were obtained:

59 had taken a Mathematics (M) course..

59 had taken a Computer science (C) course .

55 had taken a Business (B) course.

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

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

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

25 had taken all three courses.

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

Q4) Give an example of a relation R on $A = \{1, 2, 3\}$ such that:

(a) R is both symmetric and antisymmetric.

(b) R is neither symmetric nor antisymmetric.

(c) R is transitive but $R \cup R^{-1}$ is not transitive.

(d) Determine whether the empty relation \emptyset , and the universal relation $A \times A$ are:

(1) reflexive; (2) symmetric; (3) transitive; (4) antisymmetric.

Q5) test the validity of the argument:

If I study, then I will not fail mathematics.

If I do not play basketball, then I will study.

But I failed mathematics.

Therefore I must have played basketball.

Q6) Suppose that the input symbols = output symbols = $\{0,1\}$, design a FSM that will recognize the pattern **101** in the input string, and trace the following input = 01010110

Q7) Find minimum spanning tree and its weight for the following graph using algorithm 1?

