



*University of Technology*  
*Department of Applied Sciences*  
*Final Examination 2016/2017*



*Subject : Foundation of Math*  
*Branch: Mathematics and Computer Applications*  
*Examiner :L. Raghad Ibrahim*

*class:1<sup>st</sup> year*  
*Time : 3 hours*  
*Date :*

**Answer Five Questions (14 marks for each question)**

**Q1/ A-** For any propositions  $p$  and  $q$  , prove that  $(p \rightarrow q) \equiv \sim p \vee q$  .

**B-** Define the symmetric difference between any sets  $A$  and  $B$  then prove that  $A \Delta B = \emptyset \leftrightarrow A = B$  .

**Q2/ A-** State Peano's axioms and prove that  $m(n + p) = mn + mp$  ,  $\forall m, n, p \in \mathbb{N}$ .

**B-** Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be a mapping defined by  $f(x) = 5x + 1 \quad \forall x \in \mathbb{R}$  . Dose  $f$  be bijective mapping or not ? Explain your answer.

**Q3/ A-** If  $f: A \rightarrow B$  and  $g: B \rightarrow A$  are mappings such that  $f$  and  $g$  are one to one mappings . Show that  $g \circ f$  is one to one .

**B-** Define the following:

1) Power set    2) well ordered set    3) equipotents set    4) partition

**Q4/ A-** Let  $R$  be an equivalence relation on a non-empty set  $A$  and  $a, b \in A$  such that  $[a] \cap [b] \neq \emptyset$  . prove that  $[a] = [b]$ .

**B-** Check whether the relation  $R = \{(x, y) \in A \times A: x \perp y\}$  for a set  $A$  for all straight lines in a plane is an equivalence relation.

**Q5/ A-**By using mathematical induction, show that  $4 + 8 + 12 \dots + 4n = 2n(n + 1)$ ,

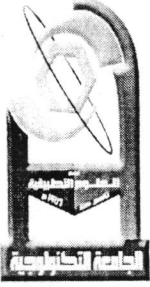
$\forall n \in \mathbb{N}$ .

**B-** If  $A$  and  $B$  are non-empty sets . Prove that  $A = B \leftrightarrow A \times B = B \times A$  .

**Q6/ A-** Prove that  $(\mathbb{N}, \leq)$  is partially ordered set.

**B-** Let  $R$  be a relation on a set  $A$  . Show that  $(R^{-1})^{-1} = R$  .

**Good Luck**



University of Technology  
Department of Applied Sciences  
Final Examination 2016/2017



Subject : General Physics  
Branch : Mathematics and Computer Application  
Examiner: Lect. Z. S. Ahmed

Class : First  
Time :3 hours  
Date : 31/5/2017

**Q.4:**

- A) Drive the power in a conductor with draw.
- B) Find the scalar product of the vectors:  $A = 4u_x + 6u_y$ ,  $B = -2u_x + 2u_y$ , and then find the angle between these vectors.

**Q.5:**

- A) Discuss the meaning of Kirchoff's law in terms of the conservation law, (with draw).
- B) What are the factors which determined the resistance of any material?

**Q.6:**

A) Complete:

- 1- The branches of physics science are: \_\_\_\_\_, \_\_\_\_\_.
- 2- The density of body ( $\rho$ ) is \_\_\_\_\_.
- 3- The coulomb is \_\_\_\_\_.
- 4- The mass dynamically is \_\_\_\_\_.
- 5- The unit vector is \_\_\_\_\_.

B) An electron accelerated in TV tube, reaches the screen with Kinetic energy of 14000 eV, Find the velocity of the electron. ( $m_e = 9.1 \times 10^{-31}$  Kg,  $1\text{eV} = 1.6 \times 10^{-19}$  J).

*Note: all questions have 10 marks.*

*Good Luck*