Menoufia University
Faculty of Engineering, Shebin El-Kom
Prod. Engg & Mech. Design Dept.
First Semester Exam., 2014-2015
Date of Exam: 12/1/2015

Subject: Nanotechnology
Code: PRE 716
Level: 700
Time Allowed: 3 hours
Total Marks: 100 Marks

Answer all the following questions:

Question 1: (25 marks)

a) Discuss the application of Nanotechnology in the following causes:-
   1) Efficient energy conversion and storage (solar cells).
   2) Use of carbon Nano-tubes for high-density storage of hydrogen.
   3) Smart materials and devices capable of detecting imminent failure and performing self-repair process.
   4) Nano-scale coatings with low friction and low corrosion properties.

b) What analytical techniques are used to characterized nano-material?
c) How are nano-materials characterized?
d) What is the nano-technology and what is the market and potential of it?

Question 2: (25 marks)

a) Describe briefly but clearly the applications of the following techniques to fabricate Nano-composites:
   1) Severe plastic deformation.
   2) High-energy milling and consolidation.

b) What is the deference between nano-since and nano-technology?
c) Why might the properties of materials structure be different at the nano-scale?
d) What is the engineered nano-materials?

Question 3: (25 marks)

a) List the most basic technology uses micro and nano machining is for the production of miniaturized parts.
b) What are the important parameters, which govern the performance of ECF processes.
c) By using net sketches, show the ability of ECM for producing micro and nano scale.
d) Discus the mechanism of material removal in MEDM and LMM in case of micro and nano machining.

Question 4: (25 marks)

a) Discuss the different methods to enhancement ECF/ECP process.
b) Discuss the applications of laser beam in machining with nano-domain.
c) Give some finishing processes are capable of giving surface finish from micro- to nano-metric range.
d) Suggest some machining techniques for producing an Ink-jet nozzle with 120 nm diameter.

With our best wishes
Prof. Dr / Ahmed Refat El-Sissy
Prof. Dr / Taha Ali El-Taweel

This exam contributes "by measuring" in achieving Programme Academic Standards according to NARS												
Question Number	Q1-a	Q2-1-b Q2-c	Q3a Q3-c	Q4-b	Q1-c	Q2- d	Q3- a	Q4-d	Q1-g	Q2-b	Q3- b	Q4- c
Skills	a2-1	a5-2	a5-4	a5-4	b4-1	b5-2	b3-2	b3-3	c4-1	c8-1	c2-1	c4-1
	Knowledge &Understanding Skills				Intellectual Skills				Professional Skills			