Menoufia University Faculty of Engineering, Shebin El-Kom Electrical Engineering Department Postgraduate-Master of science Final Term Exam		Subject/Code: Electrical Materials/ELE 608 Year : 2019-2020 Time Allowed : 3 hours Exam Date : / 8 / 2020 Total Marks : 100 marks

Allowed Tables and Charts: (None)

Answer the following questions

Question (1) *(25 Marks)*

(1-a) What is meant by super-conductivity? Does it occur with all metals? Give the applications of superconducting materials.

(1-b) Discuss the factors that must be considered in order to select suitable electrical materials.

(1-c) A resistance element having cross sectional area of 10 mm^2 and a length of 10 m takes a current of 4 A from a 220 V supply at ambient temperature of 20 °C. Find the current when the temperature rises to 60 °C. The resistance temperature coefficient at 20 °C is 0.0003/°C.

Question (2) *(25 Marks)*

(2-a) Discuss, using suitable sketches, the factor affecting the resistivity of electrical conductors.

(2-b) Give a brief comparison between low and high resistivity materials. The comparison should cover their properties as well as their applications.

(2-c) Give reasons for preferring copper for manufacturing of machine windings as compared to aluminum.

Question (3) *(25 Marks)*

(3-a) What is the effect of nanoparticle size on the surface area of nanomaterials? Declare your answer with suitable sketches.

(3-b) Discuss the variation of resistance with temperature of pure metals, alloys, and insulators.

(3-c) Discuss, with the aid of suitable sketches, the role of nanoparticles in electrical treeing growth reduction for nanocomposites.

Question (4) *(25 Marks)*

(4-a) Give reasons why high voltage overhead power transmission lines are made of aluminum and steel wires.

(4-b) What is meant by "nanofiller". What are the possible shapes of it?

(4-c) Define the terms: "nanotechnology", "nanocomposite", and "hydrophobicity".

Good Luck ..... Examiners Committee

This exam measures the following ILOs															
Skills	Knowledge &Understanding Skills					Intellectual Skills					Professional Skills				
	a1-1	a1-2	a1-2	a1.4	a3.2	b5-1	b6-2				c1-1	c1-2	c1.3	c4.2	
Question Number	Q1-a,b	Q2-a,b	Q2-c	Q4-c	Q4-c,d	Q1-c,d	Q3-a,b,c				Q4-a	Q4-b	Q4-c	Q4-a,b	