Allowed Tables and Charts: (None)

Answer the following questions

Question (1)   (20 Marks)

(1.a) Read the following statements, then check [√] or [×] in front of each. Rewrite the wrong sentence after corrections.

1- The effect of temperature on carbon and insulators is exactly similar to that of pure metals. [ ]
2- Insulation surface resistance is the resistance offered to the current, which flows straight through the volume of insulating material. [ ]
3- Resistance of cable insulation increases as its length increases. [ ]
4- Insulation resistance decreases with the increase in appied volatge. [ ]
5- Voltage increase causes increased dielectric loss. [ ]

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

(1.c) A resistor of 80 Ω resistance having a temperature coefficient of 0.0021/C° at 0 C° is to be constructed. Wires of two materials (A and B) of suitable cross-sectional area available. For material A the resistance is 80 Ω per 100 m and temperature coefficient is 0.003/ C° at 0 C°. For material B the resistance is 60 Ω per 100 m and temperature coefficient is 0.0015/ C° at 0 C°. Calculate suitable lengths of the wires of materials A and B to be connected in series to get required resistor.

Question (2)   (20 Marks)

(2.a) Write short notes on: dielectric strength – dielectric loss – dielectric constant – thermal conductivity – porosity – thermal aging.

(2.b) Explain the polarization in dielectric materials considering its types.

(2.c) Let S= 120 cm^2, d= 4 mm, and ε_r= 12 for a parallel plate capacitor. a) Calculate the capacitance, b) After connecting 40 V battery across the capacitor, calculate E, D, Q, and the total stored energy, c) The source is now removed and the dielectric carefully withdrawn from between plates. Again calculate E, D, Q, and energy, d) What is the voltage between the plates?

Question (3)   (15 Marks)

(3.a) Write short notes on: grounding resistance – step potential – touch potential.

(3.b) Discuss the factors contributing to ground electrode resistance.

(3.c) Discuss how to improve grounding resistance.

Question (4)   (15 Marks)

(4.a) Mention at least four applications at which semiconductors are used.

(4.b) Explain briefly, with the aid of suitable sketches, the conduction mechanism in an intrinsic semiconductor.

(4.c) A solar panel consists of 24 series solar cells and 6 parallel branches. Each cell has a maximum power point at (0.5 V, 1.5 A) at the higher light intensity. What is the maximum output power from the panel? What is the required load resistance to achieve maximum output power?

Question (5)　　　　　　　　　　　　　　　　　　　　　　　　　*(15 Marks)*

(5.a) What is nanotechnology, and in what electrical applications it can be used?

(5.b) Explain the two sources of magnetic moments for electrons.

(5.c) The magnetization within a bar of some metal alloy is $1*10^6$A/m at an H field of 500 A/m. Compute the following: (a) the magnetic susceptibility, (b) the permeability, and (c) the magnetic flux density within this material. (d) What type(s) of magnetism would you suggest as being displayed by this material? Why?

Good Luck .... Dr. Amr M. Abdulhady

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	This exam measures the following ILOs													
Skills	Knowledge &Understanding Skills				Intellectual Skills					Professional Skills				
	a3-1	a3-4	a21-1			b5-1	b5-2	b5-3	b6-1		c4-1				
Question Number	Q1-a,b,c	Q2-a	Q4-c			Q2-b Q4-a,b	Q2c, Q5a	Q3-a,b,c	Q5b,c		Q3-d				