



Allowed Tables and Charts: (None), Total marks: 90

Final Term Exam

Answer of the following questions and assume any missing data.

Question (1)

(30 Marks)

(1-a) Read the following statements, then check [$\sqrt{\quad}$] or [\times] in front of each.

Rewrite the wrong sentence after corrections.

- 1- In impulse generator circuit, as front resistor increase the peak value of voltage decrease. []
- 2- The time lags required for streamer breakdown in gases is 10^{-12} s. []
- 3- In electronegative gases, its breakdown voltage increases due to electron attachment to gas molecules. []
- 4- The basic principle of electrostatic machine is to convert mechanical power to electrical power through magnetic field. []
- 5- The gaps of multistage generator operate simultaneously after breakdown of last one. []
- 6- Using uniform field spark gap, the breakdown voltage for 10 mm gap length is 20 kV (peak) under standard atmospheric condition. []
- 7- Liquids with solid impurities have lower dielectric strength as compared to pure liquids.

(1-b) What are the methods used to protect transmission lines against overvoltage?

(1-c) Explain briefly the principle of high voltage generation with resonance circuits and its advantages.

(1-d) What is a composite dielectric and what are its properties. Describe the long-term breakdown in composite dielectrics.

(1-e) What is nanotechnology and polymer nanocomposites. Explain the effect of the percentage volume filler content on the DC electrical conductivity of nanocomposite.

Question (2)

(15 Marks)

Two solid dielectric specimens of dielectric constant 3.5 and 4.0 are pasted together by a thin polymer film. Each one has thickness 10 mm. The thickness of the polymer film is 1 mm and its dielectric constant is 3.8. Two voids of thickness 1 mm each are formed in the polymer film. Find the voltage across each void if 100 kV (peak) applied in:

- a) The vertical direction of the polymer film,
- b) The horizontal direction of the polymer film (take the thickness of the specimens in this direction is 20 mm).

Question (3)

(15 Marks)

Design two stages impulse voltage generator of energy rating 8 kJ at 400 kV. For producing a standard lightning impulse wave ($1.2/50\mu\text{s}$, 400 kV), calculate the generator components (C_1 , C_2 , R_1 , and R_2) if the generator capacitance equal to twenty times load capacitance ($C_g=20 C_2$).

Question (4)

(15 Marks)

An Underground cable of inductance 0.189 mH/km and of capacitance of 0.3 μ F/km is connected to an overhead line having inductance of 1.26 mH/km and capacitance 0.009 μ F/km. Calculate the transmitted and reflected voltage and current waves at the junction, if the surge of 200 kV travels along the cable to the junction in two cases,

- a) The overhead line is connected,
- b) The overhead line is disconnected,

Question (5)

(15 Marks)

A Tesla coil has a primary winding rated for 10 kV. If L_1 , L_2 and coefficient of coupling k are 10 mH, 200 mH and 0.6 respectively, find the peak value of the output voltage if the capacitance in the primary side is 2.0 μ F and that on the secondary side is 1 nF. Neglect the winding resistance. Find Also the highest resonant frequency produced with rated voltage applied.

Good Luck Prof. Mohamed Izzularab
Dr. Amr Abdel-Hady

Field	National Academic Reference Standard (NARS)			
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills
Program Academic Standards that the course contribute in achieving	A1, A8	B5, B13	C1, C5	D6
Question No.	3, 5	4	2	1