



Answer the Following Questions:

Question (1):

a.

[20 Marks]

1. What must be good solid dielectrics satisfy ?

(5 Marks)

2. Explain: the electromechanical breakdown theory in solid dielectrics.

(5 Marks)

b. Solve: The natural rubber has dielectric constant of 4.2 and a loss angle of 2.8° . If this dielectric is subjected to an alternating field of 60 kV/cm at a frequency of 50 HZ. Calculate the heat generated in dielectric. If the maximum heat permissible in this dielectric is 0.2 W/Cm^3 "safety", there is dangerous or not?

(10 Marks)

Question (2):

a. Illustrate the operation theory of DC Voltage doubler circuit?

[20 Marks]

(5 Marks)

b. The total voltage ripple of a Cock-Walton type voltage multiplier is 18 kV at a supply frequency of 90 Hz. If the load current is 3.799 mA and the circuit capacitance is $0.03518 \mu\text{F}$, calculate:

1. The number of stages

2. The percentage ripple

3. The maximum secondary voltage of the supply

4. The total voltage drop and the regulation

(15 Marks)

Assume that: The optimum number of stages for minimum voltage drop is 17 stages.

Question (3):

[20 Marks]

a) How can we overcome the drawbacks of measuring the DC High voltages in AC voltages " state the drawbacks and overcome methods "?

(5 Marks)

- b) For a series impedance of $160\text{k}\Omega$ resistance, 800mH and 30nF residual inductance and capacitance respectively, the ammeter reading is 100mA at a frequency of 50Hz . Calculate the error arose when neglecting both the residual capacitance and the residual inductance. (15 Marks)
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Question (4):

[30 Marks]

- a) What are the lightning different damaging effects? (5 Marks)
- b) What are the types of the overvoltage protection devices? (5 Marks)
- c) Design with all verifications the arrester with the new technique for Egyptian Unified Grid "E. U. G" for 400 kV line voltages. Use the accompanied tables for the old and new design. (take $V_a=0.8 V_m$) (20 Marks)
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End of Exam Questions, Good Luck