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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023**

Semester : Semester VII - 2020

Course Code : EEE3006

Course Name : Sem VII - EEE3006 - High Voltage Engineering

Program : EAE/EEE

Date : 30-OCT-2023

Time : 11:30AM - 1:00PM

Max Marks : 60

Weightage : 30%

Instructions:

- (i) Read all questions carefully and answer accordingly.
 - (ii) Question paper consists of 3 parts.
 - (iii) Scientific and non-programmable calculator are permitted.
 - (iv) Do not write any information on the question paper other than Roll Number.
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PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. What characteristics should dielectric materials possess to optimize their performance within electrical systems and applications?
(CO1) [Knowledge]
2. Power transfer for large systems depends on high system voltages. What are the chief causes of over voltages in electric power system?
(CO1) [Knowledge]
3. Marx proposed a circuit which can be used for generating high impulse voltages. Write the disadvantages of single impulse voltage generator circuit.
(CO2) [Knowledge]
4. State the necessary reasons for generating high AC and DC voltages using different circuits.
(CO2) [Knowledge]
5. What are dielectrics? Write the classification of dielectrics which are used for HV applications.
(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

(2 X 15 = 30M)

6. a. The requirement of very large size spheres for flashover at higher voltages, the increase in physical size of other circuit elements because of higher level of required insulation, the problems in obtaining high dc voltage for charging, and difficulties in suppressing the corona at the structure are the problems of one of the high voltage generated circuit. State that circuit and explain a suitable circuit which overcome the stated difficulties.
- b. A 12 stage, 2.4 MV impulse generator has an efficient circuit with a dc charging unit of 0-200 kV. Each stage is provided with a charging resistor of 16.5 kohm, internal wave front resistor 20 ohm, discharge resistor 200 ohm, and there is no external wave front resistor. Each stage is provided with four capacitors of 35 nF in parallel and the capacitance of loading capacitor is 2000 pF. If the capacitance of the test object is 1250 pF. (i) List the parameters that are associated with impulse generator can be computed with the given data. (ii). Compute the listed parameters.
7. a. For producing high power frequency test voltages of the order of ≥ 1000 kV, which type of test sets are produced? Explain those tests with necessary reasons for developing such tests.
- b. A high voltage testing laboratory is required to test an apparatus with a capacitance of the order of 1000 pF used in a 440 kV system. If the test voltage requirement is three times the system rated voltage, estimate the kVA rating of the test transformer at 50 Hz operation.

(CO2) [Comprehension]

(CO5) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

8. a. Explain Townsend's Theory of breakdown in gases. Derive the expression for self sustained discharge when the gases follow the Townsend's mechanism of breakdown. Elaborate the conditions under which the theory is valid.
- b. Three measurements of the current between two parallel plates were 1.22, 1.82 and 2.22 of the initiating photo current I_0 at distances 0.5, 1.50 and 1.9 cm respectively. E/p and p were maintained constant during the measurements. (i). List the parameters that can be computed with the given data. (ii). Compute the listed parameters. (Note: If required assume the necessary data)

(CO1) [Application]