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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester VII -2020

Course Code : EEE3006

Course Name : High Voltage Engineering

Program : B.Tech. Electrical and Electronics Engineering

Date : 03-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

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.

PART A

ANSWER ALL THE QUESTIONS

5 X 4M = 20M

1. The effective transmission of power in extensive systems relies on elevated system voltages. Mention the primary factors leading to overvoltages in electric power systems?
(CO1) [Knowledge]
2. Overvoltages refer to the occurrence of voltages in an electrical system that exceed the specified or designed levels. Define the following terminologies associated with over voltages.
a. Disruptive discharge voltage b. Fifty percent flashover voltage c. impulse voltage
(CO4) [Knowledge]
3. Accurate measurements of high voltages are paramount for the safe and reliable operation of electrical systems. Describe the key considerations, techniques, and instruments involved in accurately measuring and monitoring high voltages.
(CO3) [Knowledge]
4. What is insulation coordination in electrical systems, and why is it essential for power systems?
(CO4) [Knowledge]
5. State what attributes should dielectric materials possess to enhance their performance in electrical systems and applications?
(CO1) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

6. HVDC lines find extensive application in long-distance power transmission due to their efficiency in requiring less conductor and incurring fewer power losses than their equivalent AC counterparts. Elaborate on any two methods illustrating how the reduction of ripple in the output voltage can be achieved.
- (CO2) [Comprehension]
7. Describe the significance and methodology of partial discharge measurements in the context of electrical systems. Also explain the types of equipment and techniques commonly employed for partial discharge measurements.
- (CO3) [Comprehension]
8. State the methods commonly employed for the measurement of AC voltage. Describe the principle and operation of a method which is used for RMS voltage measurement.
- (CO3) [Comprehension]
9. Discuss the various aspects of lightning phenomena, including the formation, types, and characteristics of lightning. Explain the key factors that contribute to the occurrence of lightning.
- (CO4) [Comprehension]
10. Explain briefly different tests that are carried out on bushings and cables with respect to several terminologies that are used to test them.
- (CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 15M = 30M

11. a. An electrostatic voltmeter consists of parallel plates, one movable and one fixed. With applied between the plates, it is found that the pull is 10 milli Newtons on the movable plate. Determine the change in capacitance produced for a movement of movable plate by 1 mm. Diameter of movable plate is 150 mm.
- b. A peak reading voltmeter is required to measure voltage up to 220 kV. The peak voltmeter uses an RC circuit, a microammeter, and a capacitive potential divider. The potential divider has a ratio of 1500:1 and the microammeter can read up to 20 micro A. Determine C and R if the time constant of RC circuit is 5 s.
- (CO3) [Application]
12. A 10 stage, 2.6 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.
- (CO2) [Application]