CBCS SCHEME

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21EE71

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
High Voltage and Power System Protection

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Write any four advantages, limitations and applications of high voltage engineering. **(08 Marks)**

b. Define town sends first ionization co-efficient and derive an expression for the current in the air gap that in $I = I_o e^{\alpha d}$ **(06 Marks)**

c. In an experiment in a certain gas it was found that the steady state current in 5.5×10^{-8} A at 8 KV at a distance of 0.4 cm between the plane electrodes keeping the field constant and reducing the distance to 0.1 cm results in a current of 5.5×10^{-9}A. Calculate town sends primary ionization coefficient α. **(06 Marks)**

OR

2 a. Explain Bubbles theory and suspended particles theory and break down in liquid dielectrics. **(10 Marks)**

b. Explain the following breakdown mechanism in solid dielectrics :
   i. Thermal breakdown
   ii. Electromechanical breakdown. **(10 Marks)**

Module-2

3 a. Write a neat sketch explain the working of 4 stage Cockcraft Walton DC generator. **(10 Marks)**

b. With the help of neat sketch explain the construction and working principle of generating voltmeter. **(10 Marks)**

OR

4 a. With a neat sketch explain the marx circuit arrangement for multistage impulse generator. **(10 Marks)**

b. Explain in brief the method of discharge detection using straight detector. **(10 Marks)**

Module-3

5 a. Discuss the essential qualities of a protective relay. **(08 Marks)**

b. Explain various methods of back up protection. **(06 Marks)**

c. Write a note on protection of parallel feeder. **(06 Marks)**

OR

6 a. Draw the schematic diagram of a numerical relay and briefly describe the functions of its various components. **(08 Marks)**

b. Write the merits and demerits of static relay. **(06 Marks)**

c. Differentiate between earth fault and an over current relay. **(06 Marks)**

Module-4

7 a. What in an impedance relay? Explain its operating principle, torque equation and operating characteristics of impedance relay. **(10 Marks)**

b. Define the term pilot with reference to power line protection. List the different types of wire pilot protection scheme and explain circulating current protection. **(10 Marks)**

OR

8 a. Explain balanced (opposed) voltage differential protection. **(06 Marks)**

b. With a neat sketch explain the working of frame leakage protection used for Bus-Zone protection. **(06 Marks)**

c. With a neat diagram, explain construction and operation of Buchholz relay. **(08 Marks)**

Module-5

9 a. With a neat sketch, explain the construction and working of non-puffer type SF_6 circuit breaker. **(08 Marks)**

b. With a neat sketch, explain the phenomenon of lighting. **(06 Marks)**

c. Explain the phenomenon of current chopping with neat waveform. **(06 Marks)**

OR

10 a. With a neat sketch, explain the synthetic testing of circuit breaker. **(08 Marks)**

b. With a neat diagram, explain the construction and working of Klydonograph. **(06 Marks)**

c. What are the causes of over voltages arising on a power system? (Any 6). **(06 Marks)**

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