Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – March 2026

Date: 11-03- 2026 **Time:** 11.45am to 01.15pm

School: SOE	**Program**: B.Tech	
Course Code: EEE3003	**Course Name:** Switchgear & Protection	
Semester: VI	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**16**	**20**	**12**	**0**	**0**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

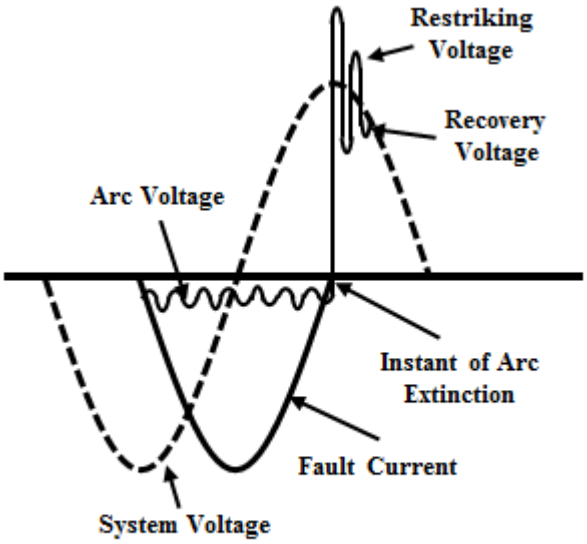
Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	List any two types of fuses	**2 Marks**	**L1**	**CO1**
2	Explain the concept of fusing factor?	**2 Marks**	**L2**	**CO1**
3	Put Contrast on the importance of reactor	**2 Marks**	**L2**	**CO1**
4	Explain the concept of RRRV in circuit breakers	**2 Marks**	**L2**	**CO2**
5	Put Contrast on the concept of back up protection	**2 Marks**	**L2**	**CO3**

Part B

Answer the Questions. **Total Marks 40M**

6.	**a.**	The arc is sustained between the contacts of the circuit breaker due to the flowing of the current through the circuit breaker. The arc itself a conductive path of electricity and for total interruption of current, the circuit breaker is required to quench the arc as quick as possible. The main designing criteria of a	**10 Marks**	**L2**	**CO2**

		circuit breaker is to provide appropriate technology of arc quenching in circuit breaker to fulfill quick and safe current interruption. The figure shown below represents this arc extinction theory. Identify the operating principle of extingishing the arc as depicted in the figure and stae one circuit breaker with proper diagram which can effectively perform this operation with minimum restriking of the arc.  **Recovery Voltage, Restriking Voltage and Arc Voltage**			
		Or			
7.	**a.**	The phase to ground capacitance in a 220 kV transmission line commissioned between gulbarga to hubli is 0.05 microfarad. The value of line inductance is 3 Henry. Determine the voltage across the pole of a circuit breaker when a magnetizing current of 15 A is abruptly stopped. The SF6 breaker is a three-phase device with a rating of 2500A, 1000MVA, operating at 33 kV for a duration of 3 seconds. After identifying the unknown parameters that could be computed from the given data, Solve for the unknown parameters	**10 Marks**	**L2**	**CO2**

8.	**a.**	A 3 phase, 60 Hz, 1.5 cycle Circuit breaker is interrupting a fault current. The fault current lags voltage by 72 degrees. If circuit breaker contacts get fully opened at voltage zero crossing, Solve for the breaker operating time.	**10 Marks**	**L3**	**CO2**
		Or			
9.	**a.**	The phase to ground capacitance in a 132 kV transmission line commissioned between gulbarga to hubli is 0.05 microfarad. The	**10 Marks**	**L3**	**CO2**

		value of line inductance is 3 Henry. Determine the voltage across the pole of a circuit breaker when a magnetizing current of 20 A is abruptly stopped. The air blast circuit breaker is a three-phase device with a rating of 2000A, 1500MVA, operating at 33 kV for a duration of 2 seconds. After identifying the unknown parameters that could be computed from the given data, Solve for the unknown parameters.			

10.	**a.**	Mr Rahul, a technician in an automobile factory, noticed that a specific section of the power system required frequent maintenance. His supervisor advised him to use isolators instead of switches for safety reasons. Explain the differences between switches and isolators, and describe situations where each should be used.	**10 Marks**	**L2**	**CO1**
		Or			
11.	**a.**	Ms. Priya, an electrical engineer in a power distribution company, was asked to ensure the protection of a newly installed substation. She had to select the right components for the protection system. Explain the different components of a protection system and how they contribute to the safety and reliability of the electrical network.	**10 Marks**	**L2**	**CO1**

12.	**a.**	The Plug Setting Multiplier (PSM) is a concept used in protective relaying to determine the sensitivity of a relay to detect faults. It is a numerical value that is multiplied by the relay's current setting to establish the threshold at which the relay will trip and initiate protective actions. Explain the calculation process of PSM (Plug Setting Multiplier) and its importance in determining the operational parameters of a relay. Offer instances to demonstrate the utilization of PSM in protective relaying methods.	**10 Marks**	**L2**	**CO3**
		Or			
13.	**a.**	A Power system supplied by two Synchronous generators at the two buses X and Y respectively has been shown below. The Transmission line XY has positive sequence impedance of Z_1 Ohms and zero sequence impedance of Z_0 Ohms. An Single Line to Ground fault with zero fault impedance occurs at the centre of the transmission line in Phase R. Bus voltage at X and line current from X to F for the phase 'R', are given by Va Volts and Ia amperes, respectively. Impedance relay has been installed for the protection of transmission line at bus X. Explain how relay	**10 Marks**	**L2**	**CO3**

		operate for Single Line to Ground fault as shown in the figure below.