

Code: 20EE3601

**III B.Tech - II Semester – Regular / Supplementary Examinations
APRIL 2024**

**SWITCHGEAR & PROTECTION
(ELECTRICAL & ELECTRONICS ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Explain the terms recovery voltage, restriking voltage, RRRV and avg. RRRV.	L3	CO2	6 M
	b)	Derive an expression for the restriking voltage in terms of system capacitance and inductance.	L4	CO2	8 M
OR					
2	a)	Describe the construction, principle of operation, advantages and application of SF6 Circuit breaker.	L3	CO2	9 M
	b)	Interpret the phenomenon of current chopping in a circuit breaker.	L4	CO3	5 M

UNIT-II					
3	a)	Describe the principles of protective relaying and list out its functional characteristics.	L3	CO4	7 M
	b)	Deduce the general equation for torque developed in an induction relay.	L4	CO3	7 M
OR					
4	a)	Describe the working of a balanced beam type electromagnetic relay with the help of a neat sketch.	L3	CO2	7 M
	b)	Illustrate how an amplitude comparator can be converted to a phase comparator and vice-versa.	L4	CO4	7 M
UNIT-III					
5	a)	With the help of neat sketch explain the principle of operation of percentage differential relay.	L3	CO5	7 M
	b)	Discuss the operational characteristics of an impedance relay in R-X plane.	L3	CO3	7 M
OR					
6	a)	Explain the universal torque equation and determine the condition for reactance relay and mho relay.	L3	CO4	8 M
	b)	Illustrate the working principle & operation of over current relay.	L4	CO3	6 M

UNIT-IV					
7	a)	An 11kv, 100MVA generator is provided with differential scheme of protection. The percentage of the generator winding to be protected against phase to ground fault is 80%. The relay is said to operate when there is 15% out of balance current. Determine the value of resistance to be placed in the neutral to ground connection.	L4	CO4	8 M
	b)	Describe the three-zone distance relay protection of transmission line using impedance relays.	L3	CO5	6 M
OR					
8	a)	Discuss the working principle and operation of Buchholtz relay with the help of a neat circuit diagram.	L3	CO3	7 M
	b)	Describe the restricted earth faults and inter-turn faults in generators? Explain the protection schemes employed for these faults.	L3	CO6	7 M
UNIT-V					
9	a)	Enumerate the effects of ungrounded neutral on system performance.	L3	CO3	6 M
	b)	Analyze Peterson coil (Arc suppression coil) grounding and derive the equation for “L” inductance of the coil.	L4	CO5	8 M
OR					

10	a)	Classify various types of groundings? Explain in detail reactance grounding.	L3	CO5	7 M
	b)	Briefly explain any one methods of overvoltage protection of overhead transmission line.	L3	CO6	7 M