

Code: 23EE4601A

III B.Tech - II Semester - Regular Examinations – APRIL 2026

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

Duration: 3 hours

Max. Marks: 70

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- Note: 1. This question paper contains two Parts A and B.
 2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
 3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
 4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

PART – A

		BL	CO
1.a)	What is a MCB? Write its function.	L2	CO1
1.b)	Define the term RRRV.	L3	CO2
1.c)	Mention the difference between a fuse and a relay.	L3	CO2
1.d)	Why are differential relays more sensitive than over current relays?	L3	CO2
1.e)	Mention the most used protection scheme for alternators.	L3	CO4
1.f)	Name any two different transformer faults.	L2	CO1
1.g)	How earth fault protection is achieved in case of feeder?	L2	CO1
1.h)	Define Plug-setting multiplier.	L3	CO4
1.i)	Mention the function of lightning Arrester.	L3	CO4
1.j)	Define neutral grounding.	L3	CO4

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Describe the phenomenon of (i) Current chopping (ii) Resistance switching.	L3	CO2	5 M
	b)	A circuit breaker is rated at 1500 A, 2000 MVA, 33 kV, 3 sec, 3-phase oil circuit breaker. Determine (i) the rated normal current (ii) breaking current (iii) making current (iv) short time rating current.	L4	CO3	5 M
OR					
3	a)	Discuss the principle of operation of an air-blast circuit breaker. What are the advantages and disadvantages of using air as the arc quenching medium?	L2	CO1	5 M
	b)	Compare the performance of SF6 gas with air when used for circuit breaking.	L4	CO3	5 M
UNIT-II					
4	a)	Describe the construction and principle of operation of an induction type over current relay.	L3	CO2	5 M
	b)	Compare IDMT and DMT overcurrent relays in terms of operating characteristics and applications.	L4	CO3	5 M
OR					
5	a)	Describe the operating principle, constructional features and area of applications of directional relay.	L2	CO1	5 M

	b)	Draw and explain the characteristics of a mho relay on an R-X diagram	L3	CO3	5 M
UNIT-III					
6	a)	Describe protection scheme of an alternator against inter-turn fault.	L3	CO4	5 M
	b)	A star-connected, 3-phase, 10-MVA, 6.6 kV alternator has a per phase reactance of 10%. It is protected by Merz-Price circulating-current principle which is set to operate for fault currents not less than 175 A. Calculate the value of earthing resistance to be provided in order to ensure that only 10% of the alternator winding remains unprotected.	L4	CO5	5 M
OR					
7	a)	Describe the construction and working of a Buchholz relay.	L3	CO4	5 M
	b)	A 3-phase transformer of 220/11,000 line volts is connected in star/delta. The protective transformers on 220 V side have a current ratio of 600/5. What should be the CT ratio on 11,000 V side?	L4	CO5	5 M
UNIT-IV					
8	a)	Explain the principle of operation of impedance-type distance relays and discuss their application in transmission line protection.	L2	CO1	5 M

	b)	A relay is connected to 200/5 ratio current transformer with current setting of 120%. Calculate the Plug Setting Multiplier when circuit carries a fault current of 2000A.	L4	CO5	5 M
OR					
9	a)	Explain the principle of operation of differential protection scheme used for bus bar protection.	L3	CO4	5 M
	b)	Explain the construction and basic components of a static relay and describe its operation.	L2	CO1	5 M
UNIT-V					
10	a)	What is lightning? Describe the mechanism of lightning discharge.	L2	CO1	5 M
	b)	Explain the operation of Zinc-Oxide Lighting Arresters.	L3	CO4	5 M
OR					
11	a)	Discuss the advantages of (i) Grounding the neutral of the system (ii) keeping the neutral isolated.	L3	CO4	5 M
	b)	Explain the phenomenon of “arcing grounds” on overhead transmission lines.	L3	CO4	5 M