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Question Paper Code	12581
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B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Seventh Semester

Electrical and Electronics Engineering

20EEL710 - POWER SYSTEM PROTECTION AND SWITCHGEAR

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

	Marks	K-Level	CO
1. Outline the significance of backup protection.	2	K2	CO1
2. Define arcing ground.	2	K1	CO1
3. What is the term pick up value in a protective relay?	2	K1	CO2
4. Compare Instantaneous OC relay and IDMT relay.	2	K2	CO2
5. Outline the reason for complexity in generator protection as compare to protection for other elements of the power system.	2	K2	CO3
6. List the difficulties of differential protection.	2	K1	CO3
7. Outline the function of sample and hold circuit in numerical protection.	2	K2	CO4
8. List the components of static relay.	2	K1	CO4
9. Define breaking and making capacity of a circuit breaker.	2	K1	CO5
10. Define current chopping.	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11. a) Explain in detail about the need and different methods of neutral grounding.	13	K2	CO1
OR			
b) i) Outline the essential qualities of protective relaying.	7	K2	CO1
ii) Explain the different nature and causes of fault and the importance of power system protection.	6	K2	CO1
12. a) From the universal torque equation infer the trip law for impedance relay and reactance relay along with the characteristics sketch on R-X plane.	13	K2	CO2
OR			
b) Infer the torque equation of directional over current relay.	13	K2	CO2
13. a) Explain various faults and abnormal operating conditions in a generator	13	K2	CO3

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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OR

- b) A 3 phase 200 kVA, 11kV/400V transformer is connected in Δ/Y . The CT Ratio on low voltage side have turns ratio 500/5. Infer the CT ratio on high voltage side and also what is the circulating current is when the fault of 750A of following type occurs on low voltage side. 13 K2 CO3
- (i) Earth fault within the protected zone
(ii) Earth fault outside the protected zone

14. a) Make use of static phase comparator for synthesis of Mho relay. 13 K3 CO4

OR

- b) Explain numerical over current protection and numerical differential protection. 13 K2 CO4

15. a) Show the expression for the restriking voltage and maximum RRRV in a circuit breaker. 13 K2 CO5

OR

- b) Explain the phenomenon resistance switching in a circuit breaker. 13 K2 CO5

PART - C (1 × 15 = 15 Marks)

16. a) i) In Short circuit test on a 3 pole, 132 kV circuit breaker, the following observations are made. P.F for fault =0.4, recovery voltage 0.9 times full line value. Breaking current is symmetrical. Frequency of oscillation of restriking voltage 16 kHz. Assume neutral is grounded and fault is not grounded, Infer the RRRV. 10 K2 CO5

- ii) Infer the duality between amplitude and phase comparator. 5 K2 CO4

OR

- b) i) Infer the average RRRV of 132 kV circuit breaker with neutral earthed. Short circuit data are as follows: Broken current is symmetrical. Restriking voltage has frequency 20 kHz. P.F=0.15. Fault is earthed. 10 K2 CO5

- ii) Explain static distance relay. 5 K2 CO4