

R18

Code No: 156CM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, January/February - 2025

POWER SYSTEM PROTECTION
(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

- Note:** i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

- 1.a) What is the difference between a static relay and a conventional relay? [2]
- b) What is the principle of electromagnetic relays? [3]
- c) What is the protection scheme for overcurrent? [2]
- d) Draw the R-X characteristics of MHO relay. [3]
- e) Why is overload protection not necessary for alternators? [2]
- f) Give the advantages of Carrier Current Protection in Long Transmission lines. [3]
- g) What are the advantages of microprocessor based relays? [2]
- h) How elliptical relay characteristics are realized? [3]
- i) How is the arc extinguished in a circuit breaker? [2]
- j) Discuss the advantages and disadvantages of a fuse. [3]

PART – B

(50 Marks)

- 2.a) What are the different types of faults, causes of faults and their effects in a power system?
- b) What do you mean by zones protection? Why adjacent zones are overlapped? [5+5]

OR

- 3.a) How would you explain primary and back up protection and also explain various methods of back-up protection?
- b) Compare and contrast the Current Transformer and Potential Transformer. [5+5]

- 4.a) What are the various over current protective schemes? Discuss their merits, demerits and field of applications.
- b) What are blinders? In what circumstances are they used in conjunction with a MHO relay? [5+5]

OR

- 5.a) Distinguish between an earth fault relay and an over current relay. Discuss various methods to energies an earth fault relay.
- b) "The performance of Impedance relay is better than mho relay". Justify the statement with valid reasons. [5+5]

- 6.a) "The phase angle of the current entering one end of the protected line section is compared with the current leaving the other end". Justify the statement with Phase Comparison Carrier Current Protection for a transmission line.
- b) An 11 KV, 100 MVA alternator is provided with differential protection. The percentage of winding to be protected against phase to ground fault is 85%. The relay is set to operate when there is 20% out of balance current. Determine the value of resistance to be placed in the neutral to ground connection. [5+5]

OR

- 7.a) What is carrier aided distance protection? What are its different types? Discuss the permissive protection under-reach transfer tripping scheme of protection.
- b) A 66 kV, 150 MVA alternator is grounded through a resistance of 5 ohm. The CTs have a ratio of 1200/5. The relay is set to operate when there is amount of balance current of 1 A. What percentage of the generator winding will be protected by the percentage differential scheme of protection? [5+5]

8. Illustrate how an amplitude comparator can be converted to a phase comparator and vice Versa. [10]

OR

9. Describe the realization of a directional over current relay using a microprocessor. [10]
- 10.a) Discuss the constructional and principle operation of Minimum oil circuit breaker. What are its advantages over other types of circuit breaker?
- b) In a system of 132 KV, the line to ground capacitance is 0.03 uF and the inductance is 5 H. Determine the voltage appearing across the pole of C.B if a magnetizing current of 8 amps is interrupted. [5+5]

OR

- 11.a) With a neat diagram discuss the constructional and principle operation of SF₆ circuit breaker. What are its relative merits and demerits?
- b) For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3 Ohms and 0,015 μF respectively. Calculate the following:
- The frequency of Transient oscillation
 - The maximum value of restriking voltage across the contacts of the circuit breaker
 - The maximum value of RRRV. [5+5]

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