

R18

Code No: 156CM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

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) Define potential transformer. [2]
- b) Explain the working principle of electromagnetic relay. [3]
- c) What are the errors in CT? [2]
- d) Explain the Concept of Reduction of measuring units. [3]
- e) What is the need for protection equipment in generators? [2]
- f) What is unit type protection? [3]
- g) What is phase comparator? [2]
- h) What is integrating comparator? [3]
- i) What is the use of circuit breakers? [2]
- j) Write the specifications considered for a circuit breaker. [3]

PART - B

(50 Marks)

- 2.a) What is the need of static relays for power system protection? What are the advantages of static relays over thermal relays?
- b) Explain Operating Principles and Construction of thermal relays. [5+5]

OR

- 3.a) Explain the principle operation of microprocessor based protective relays.
- b) Explain the different types of protection that are used in the power system. [5+5]

- 4.a) Explain the effect of line length and source impedance on the performance of distance relays?
- b) A 6.6 kV, 4000 kVA star connected alternator with a transient reactance of 2Ω per phase and negligible resistance, is protected by a circulating current protective system. The alternator neutral is earthed through a resistor of 7.5Ω . The relays are set to operate when there is an out of balance current of 1 A in the secondary windings of the 500/5 current transformers. What percentage of each phase winding is protected against an earth fault? [5+5]

OR

5. Explain the following:

- a) Current setting
- b) Over current protective schemes. [5+5]

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6. Explain with a neat schematic diagram the working of carrier current protection against magnetic inrush current in transformer. [10]

OR

- 7.a) Explain the working principle of wire pilot protection.
b) A 3-phase, 2 pole, 33 KV, 8300 KVA generator has neutral earthed through a resistance of 3.66 ohms. The machine has current balance protection which operates up on out of balance current exceed 20 % of full load. Determine % of winding protected against earth fault. [5+5]

- 8.a) Explain the merits and demerits of static relays.
b) What are the types of static over current relays? Sketch the characteristics and explain. [5+5]

OR

- 9.a) Explain the Elliptical relay characteristics.
b) Compare static directional relay and differential relay. [5+5]

- 10.a) Explain the different types of fuses and its applications.
b) Explain the concept of the arcing of circuit breakers. [5+5]

OR

- 11.a) What is meant by recovery voltage and restriking voltage? Derive the expressions for average and Maximum RRRV.
b) Explain the operation of air blast Circuit Breakers. [5+5]

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