Code No: 127HX **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, July/August - 2023

SWITCH GEAR AND 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) Discuss the properties of SF6 which make it most suitable to be used in circuit breakers. [2]

b) What are the advantages of an air blast circuit breaker over the oil circuit breaker? [3]

c) Distinguish between the term 'over load' and 'over current'. [2]

d) Explain the term PSM and TMS with reference to IDMT relays. [3]

e) Discuss the problems that arise in the application of differential protection of a power transformer. [2]

f) What are the CT requirements for generator differential protection? [3]

g) Distinguish between unit protection and non-unit protection. [2]

h) Explain how equipment grounding is different from neutral grounding. [3]

i) What protective measures are taken against lightning overvoltages? [2]

j) What are the causes of over voltages arising on a Power system? [3]

PART – B

(50 Marks)

2. Explain the terms: restriking voltage, recovery voltage and RRRV. Derive expressions for restriking voltage and RRRV in terms of system voltage, inductance and capacitance. What measures are taken to reduce them? [10]

OR

3.a) Explain the phenomenon of current chopping in a circuit breaker. What measures are taken to reduce it?

b) Explain the working of Vacuum circuit breaker with a neat diagram. [5+5]

4.a) Explain the principle of circulating current differential protection.

b) Explain the working of Reactance relays. [5+5]

OR

5.a) How is directional control realised in an electromagnetic-type directional overcurrent relay giving inverse time–current characteristics?

b) Distinguish between Static relays and Electromagnetic relays. [5+5]

6. Why is it necessary to provide protection to a generator in the event of the following types of faulty conditions?
a) Heavy unbalanced load b) Rotor earth-fault. [5+5]

OR

7.a) Explain the phenomenon of magnetising inrush current in power transformers.
b) Discuss the factors required to be considered while setting overcurrent and earth-fault relays for transformer protection. [5+5]

8.a) Explain the phenomena of "Arcing grounds" on overhead transmission lines. How does Neutral earthing oppose arcing ground currents?
b) Explain why carrier current protection is suitable for important inter connected lines.[5+5]

OR

9.a) List the advantages of Neutral grounding.
b) Explain in detail about Solid or Effective Earthing. [4+6]

10.a) What is a ground wire? What are the requirements to be satisfied by ground wires to provide efficient protection to lines against direct lightning strokes?
b) Explain standard Impulse test wave. [6+4]

OR

11.a) Distinguish in detail between Surge diverter and Surge absorber.
b) Explain the construction and principle of operation of Valve type lightning arrester.[4+6]

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