

Code No: 137SD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, December - 2019

SWITCH GEAR AND PROTECTION

(Electrical and Electronics Engineering)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full 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 meant by recovery voltage? [2]
- b) Write the disadvantages of SF<sub>6</sub> circuit breakers. [3]
- c) What is the difference between plug setting and pick-up value of an over current relay. [2]
- d) Why is percentage differential relay more stable than simple differential relay? [3]
- e) What do mean by loss of excitation in the context of generator protection? [2]
- f) Why does a generator need to be tripped in case of loss of excitation? [3]
- g) What are the basic requirements of an earthing system? [2]
- h) What are the effects of ungrounded neutral on system performance? [3]
- i) What is the switching over voltages? [2]
- j) What are the various methods of overvoltage protection of over head transmission lines? [3]

## PART – B

(50 Marks)

- 2.a) Explain the arc interruption methods used in a circuit breaker.
  - b) What are the advantages of SF<sub>6</sub> Circuit Breakers? [7+3]
- OR
- 3.a) Explain the phenomenon of current chopping in a circuit breaker.
  - b) Describe the construction, principle of operation of a Vacuum circuit breaker. [5+5]
- 4.a) Describe the construction, principle of operation of an induction cup type of relay.
  - b) What is an IDMT characteristic? Explain how this is achieved in practice. [6+4]
- OR
5. What is an impedance relay? Discuss its principle of operation. Show its characteristics on R-X diagram. What is the merit of this relay for transmission line protection? [10]
  6. What are various faults that occur in the rotor of an alternator and how the rotor is to be protected from these faults? [10]
- OR
- 7.a) What is Buchholz Relay? Which equipment is protected by it? Discuss its working principle.
  - 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 the resistance to be placed in the neutral to ground connection. [5+5]

- 8.a) What are the various methods of neutral grounding? Compare their performance with respect to fault level, stability, voltage levels of power system.
- b) Explain in detail the solid grounding scheme for three-phase systems. Also mention its advantages and disadvantages. [5+5]

OR

- 9.a) Discuss about arcing grounds and grounding practices.
- b) Explain the resistance grounding scheme and mention its advantages and disadvantages. [5+5]
- 10.a) Enumerate the basic concepts of insulation coordination.
- b) Describe the construction, principle of operation of valve type lightning arrester. [5+5]

OR

- 11.a) What are the causes of over voltages arising on a power system? Why is it necessary to protect the lines and other equipment of the power systems against overvoltage?
- b) Describe the construction, principle of operation of zinc-oxide type lightning arrester. [5+5]

---ooOoo---

UNIVERSITY USED 11-12-2019 PM