

**R15**

Code No: 127HX

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, November/December - 2018

**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, c as sub questions.

**PART-A**

(25 Marks)

- 1.a) What is the use of circuit breakers? [2]
- b) What is meant by recovery voltage and restriking voltage? [3]
- c) What is meant by MHO relay? [2]
- d) What are the advantages of static relays over electromagnetic relays? [3]
- e) What is differential protection? [2]
- f) How do you protect generator against stator faults? [3]
- g) What is earthing? What is its need? [2]
- h) What is arcing grounds? [3]
- i) What are the main lightning protection schemes? [2]
- j) What are the switching over voltages. [3]

**PART-B**

(50 Marks)

- 2.a) What is a vacuum circuit breaker? Explain its working principle.
  - b) Discuss the operation, advantages and applications of SF<sub>6</sub> circuit breaker. [4+6]
- OR**
- 3.a) Define RRRV? Explain the calculation of average and Maximum RRRV.
  - b) In a short circuit test on 130kV, three-phase system, the circuit breaker gave the following results: p.f. of fault: 0.45, recovery voltage 0.95 times full line voltage, breaker current symmetrical and restriking transient had a natural frequency 16kHz. Determine average RRRV. Assume fault is grounded. [4+6]
4. What is a relay? What are different types of relays? Explain the operation of induction disc type electromagnetic relay. [10]
- OR**
5. What are distance relays? What are the applications of distance relays? Discuss the effect of line length and source impedance on distance relays. [10]

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6.a) What are the main faults that occur in generators? Explain the protection of generators against rotor faults.

b) The neutral point of a 11 kV alternator is earthed through a resistance of  $12\Omega$ , the relay is set to operate when there is out of balance current of 0.8 A. The C.T.s have a ratio of 200/5. What percentage of the winding is protected against earth faults? What must be the minimum value of earthing resistance required to give 90% of protection to each phase? [5+5]

OR

7.a) What is a Buchholz relays? Explain its operation.

b) The primary winding of a transformer has 2000 turns and CT ratio is 600:5. The secondary has 10000 turns and is working on a tap of 60%. Find out CT ratio required for secondary side to establish circulating current scheme. [5+5]

8.a) What are the faults that occur in transmission system? List different protection schemes used in transmission systems.

b) What is a Translay Relay? Explain its operation. [5+5]

OR

9.a) Explain the resistance grounding scheme and mention its advantages and disadvantages.

b) What is reactance grounding? Mention its disadvantages. [5+5]

10.a) What are lightning over voltages? Explain its causes.

b) What are lightning arresters? Explain its working principle. [5+5]

OR

11.a) Explain the purpose of insulation coordination.

b) Explain the working of Zinc oxide (ZnO) surge arresters. [5+5]

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