Code No: 117HX

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, November/December - 2017
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) List the major components of circuit breakers.   [2]
  b) What is the difference between a circuit breaker and a disconnecting switch?   [3]
  c) What is an induction relay?   [2]
  d) What is a mho relay?   [3]
  e) What is the need for protection equipment in generators?   [2]
  f) What is a current transformer? Explain its use.   [3]
  g) What is a carrier current distance relay?   [2]
  h) Explain the need for neutral grounding.   [3]
  i) List different types of surge arresters.   [2]
  j) What is voltage surge? Explain.   [3]

PART-B

(50 Marks)

2.a) What is meant by recovery voltage and restriking voltage? What is RRRV? How to
     obtain RRRV? Give the expressions for average and Maximum RRRV.
  b) What is a circuit breaker? Explain the operation of Oil Circuit Breakers.   [5+5]
                                    OR
3.a) What is the role of circuit breakers in substations? Explain the specifications of circuit
     breakers.
  b) Explain the operation and applications of Air-Blast Circuit Breakers.   [5+5]

4.a) What are static relays? Discuss the advantages of static relays over electromagnetic
     relays.
  b) Discuss the construction and operation of attracted armature relay.   [5+5]
                                    OR
5.a) With a neat diagram, explain the operation of balanced beam type relay.
  b) Explain the working of IDMT relay with a neat circuit diagram.   [5+5]

6.a) Discuss the protection of generators against stator faults.
  b) A 50 MVA, 3 phase, 33 kV synchronous generator is protected by the Merz-Price
     protection using 1000/5 ratio C.T.s. It is provided with restricted earth fault protection
     with the earthing resistance of 7.5 Ω. Calculate the percentage of winding unprotected in
     each phase against earth faults if the minimum operating current of the relay is 0.5 A.
                                                                                        [5+5]

OR

7.a) Explain the Buchholtz relay operation with a neat sketch.

b) The primary of a transformer winding has 1000 turns while secondary has 500 turns. If the primary CT ratio is 100:5, find the CT ratio required in the secondary side to establish circulatory current scheme. [6+4]

8.a) Discuss the principles of distance relays?

b) Explain the measurement of distance between the fault and the distance relay. [4+6]

OR

9.a) What are various methods commonly used for neutral grounding?

b) Explain in detail the solid grounding scheme for three-phase systems. Also mention its advantages and disadvantages. [4+6]

10. What is lightning? List its properties. Discuss the methods of protection against lightning. [10]

OR

11.a) What is insulation coordination? Explain its principle.

b) Discuss the following terms related to insulation coordination.
   i) BIL
   ii) Withstand voltage
   iii) Chopped wave insulation level
   iv) Critical flashover voltage
   v) Impulse ratio [5+5]

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