2021
B.E. (Electrical and Electronics Engineering)
Fifth Semester
EE-501: Power Systems – II

Time allowed: 3 Hours   Max. Marks: 50

NOTE: Attempt _five_ questions in all, including Question No. 1 which is compulsory
and selecting two questions from each Unit.

x-x-x

I.   Answer the following:-

  a) Differentiate between unit and non-unit protection of power system.

  b) Which circuit breaker has the lowest voltage range?

  c) What is a static relay and under what conditions it is preferred?

  d) Give the technical names of Impedance and Reactance relays?

  e) How do you overcome the various limitations arising in differential protection of
     power transformer?   (5x2)

UNIT – I

II. a) Derive the expression for restriking voltage transient of a circuit breaker.

  b) A 15 kV, 2 MVA generator has a reactance of 15% connected to a transformer of
     15/3.3 kV, 2 MVA, with leakage reactance of 8%. A load of 2 ohms is connected to
     the low tension side of the transformer. Find the per unit impedance of load referred to
     in the circuit and draw the reactance diagram for the whole system.   (4,6)

III. a) Discuss the evolution in relay technology that has occurred during the last few
     decades. Also, explain the various functions of digital programmable relays.

  b) Draw the zero sequence network for a star connected generator earthed through a
     resistance R.   (6,4)

IV. A 50 MVA, 132/66 kV, delta/star three-phase power transformer is protected by
     differential protection. If the CTs located on delta and star sides of the power transformer
     are 300/5 A and 1200/5 A respectively, determine:
     a) the output current at full load
     b) the relay current at full load
     c) the minimum relay current setting to permit 25% overload.   (10)

P.T.O.

UNIT – II

V. A 50 Hz 3-phase alternator with grounded neutral has an inductance of 1.6 mH per phase and is connected to the busbars through a circuit breaker. The capacitance to earth of the circuit between alternator and the circuit breaker is 0.0032uF per phase. Due to short on the busbars, the breaker opens when the rms value of the current is 8000A. Determine the following:

    a) Frequency of oscillations
    b) Active recovery voltage
    c) Time for maximum RRRV
    d) Maximum RRRV   (10)

VI. a) A 132 kV, 3-phase, 50 Hz transmission line 200 km long consists of three conductors of effective diameter 20 mm arranged in a vertical plane with 4m spacing and regularly transposed. Find the inductance and kVA rating of arc suppression coil in system.

    b) Differentiate between resonant grounding and solid grounding.   (6,4)

VII. a) What are the causes of overvoltage in power system? Also, give its classification and state the various causes of its occurrence in detail.

    b) Calculate the CT ratios on the two sides of a three-phase transformer rated 40 MVA, 220/132 kV which is protected by differential protection. Assume the fault is more than 150% of FL current and the relay setting current is 5 A.   (5,5)

x-x-x