Total Number of Pages : 02

B.Tech
PCEE4402

8th Semester Back Examination 2018-19
POWER SYSTEM PROTECTION
BRANCH : EEE, ELECTRICAL
Time : 3 Hours
Max Marks : 70
Q.CODE : F080
Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right-hand margin indicate marks.

Q1   **Answer the following questions :**   (2 x 10)
a)   Define the terms : i. burden ii. Operating time of a relay.
b)   Define bias in a biased differential relay.
c)   If the zero-sequence current of a generator for line to ground fault is j2.4 p.u., then what is the current through the neutral during the fault? Answer, with reasoning.
d)   Draw the zero-sequence network for a Δ-Δ connected 3-phase transformer.
e)   Draw the sequence impedance diagram for a single line to ground fault near a generator with no load.
f)   State the reasons for using IDMT relays for overcurrent protection.
g)   Draw the offset mho relay characteristics.
h)   Briefly explain, what is RRRV?
i)   Keeping in view the cost and overall effectiveness, which of the the following CBs is best suited for capacitor bank switching and why? CBs are vaccum, airblast, SF_6 and oil type.
j)   What is the role of anti-aliasing filter in a digital relay?

Q2   a)   Derive an expression for total complex power in a 3-phase system in terms of   **(5)**
          symmetrical components of voltage and currents.
       b)   Derive an expression for fault current line-to-line fault by symmetrical   **(5)**
          components method.

Q3   a)   Explain the working and constructional features of a reactance relay.   **(5)**
       b)   Explain the duality between an amplitude and a phase comparator.   **(5)**

Q4   a)   Enumerate the various types of protection used in an alternator. Describe one   **(5)**
          method for the protection of stator of an alternator against faults.
       b)   Discuss the general principle of operation of a transformer differential protection   **(5)**
          scheme? And explain percentage differential relay?

Q5   a)   For a 132-kV system, the reactance and capacitance up to the location of the   **(5)**
          circuit breaker is 3 ohms and 0.015µF, respectively. Calculate the following:
          i.   The frequency of transient oscillation.
          ii. The maximum value of restriking voltage across the contacts of the circuit breaker.
          iii. The maximum value of RRRV.
       b)   What is resistance switching? Find an expression for critical resistance.   **(5)**

Q6   Explain with necessary diagram the principle of operation of a distance   **(10)**
protection scheme. How a 3 zone stepped units help to achieve fast
discrimination?

Q7   Draw the block diagram of a numerical relay and explain? Also, critically   **(10)**
compare it with the electromagnetic relays.

Q8   **Write short answer on any TWO :**   **(5 x 2)**
   a) Transformer Protection
   b) SF_6 circuit breaker
   c) Air Blast circuit breaker