Registration no: | | | | | | | | | | |

Total Number of Pages: 02

B.TECH
PCEE4402

8th Semester Regular / Back Examination 2016-17
POWER SYSTEM PROTECTION

BRANCH(S): EEE, ELECTRICAL
Time: 3 Hours
Max Marks: 70
Q.CODE: Z112
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) What is reach of relay?
b) What would be the PSM for the relay if the fault current is 120 A, given the plug setting is 1.2 A and the CT ratio is of 50/1?
c) What is back up protection?
d) What type of relay is preferred for a loss of prime mover case?
e) What is a negative sequence relay? Draw its circuit diagram.
f) What is auto-reclosing?
g) What is the difference between measuring CT and protection CT?
h) What is zone of protection?
i) What is the difference between unit and non-unit protection?
j) What is RRRV? Find out is expression and when is it maximum.

Q2 **a)** Describe the Merz-Price protection scheme for bus bars. What for is the linear coupler used? **(6)**

b) Derive the torque equation for a directional overcurrent relay? **(4)**

Q3 Derive the relay equation of the mho relay and draw the region of operation in this case. **(10)**

Q4 **a)** Explain the pilot-wire protection. What are the difficulties in the protection scheme of pilot wire? **(5)**

b) What is difference between earth fault and restricted earth-fault relay? Explain its circuit and its application to different apparatus protection? **(5)**

Q5 **a)** Explain the duality between phase comparator and amplitude comparator with necessary diagram and example. **(5)**

b) The neutral point of a three-phase 20 MVA, 11 kV alternator is earthed through a resistance of 3 ohms, the relay is set to operate when there is an out of balance current of 1.2 A. The CTs have a ratio of 1000/5. What percentage of winding is protected against an earth fault? **(5)**

Q6 **a)** What do you mean by time grading of distance relays? Explain with an example. **(5)**

b) A three phase transformer having a line voltage ratio of 400V/11 kV is connected in delta-star. The CTs on the 400 V side have a current ratio of 1000/5. What must be the ratio of CTs on the 11 kV side? **(5)**

Q7 **a)** Explain the phenomena of current chopping. **(4)**

b) Derive the analysis of L-L-G fault considering fault and neutral impedance. What would be the expression of fault current in this case. **(6)**

Q8 **Answer any two:** **(5 x 2)**

a) Inrush phenomena in transformer and necessary protection scheme
b) SF_6 circuit breaker
c) Pilot Wire Protection
d) Numerical Relay and its components