BENGAL ENGINEERING AND SCIENCE UNIVERSITY,SHIBPUR

M.E.(Elec.Engg) 2nd SEMESTER EXAMINATION 2013

POWER SYSTEM PROTECTION

(EE-1015)

Time: 3 hours

Full Marks: 70

(Two marks are reserved for neatness in each half)

GROUP-A

(Answer Q. No.1and any three questions from this group)

1 What happens when (any four)

[2.5x4 +1]

a) Generator Field Breaker Trips,
b) Master Fuel Relay operates,
c) Turbine Lockout Relay operate,
d) Generator Lockout Relay operate,
e) Abnormally low furnace draft,
f) All P.A fans trip,

annunciation appears in the annunciation panel. Justify your answer with logic diagram.

2 a) Derive the expression of transient magnetizing current in a C.T.
b) Explain the theory of capacitor voltage transformer.

[6+5]

3 What is Power Swing ? Derive the expression of swing impedance seen by a distance relay. Explain the power swing blocking technique.

[3+4+4]

4 "A Phase comparator can be used as an Amplitude comparator and vice-versa"- Justify .Obtain the straight line characteristics from the generalized theory of Asymmetric phase comparator.

[6+5]

5 a) Explain the principle of operation of Block Average type phase comparator.
b) Explain: i) Pulse comparison and ii) Phase splitting techniques.

[5+3+3]

6 Derive the input quantities require to develop i) Ohm relay, ii) Directional relay,
iii) Mho relay characteristics- by using Rectifier Bridge type amplitude comparator.

[3.5+3.5+4]

Group B

Answer question no 7 and any one question from this group

7 i) What do you mean by "window length" and "sampling rate "in signal processing for numerical relaying?

ii)On what criterion does the sampling rate depend and why is it necessary?

iii)What is adaptive relaying? Cite certain application areas.

[2+2+2+2+3]

8a) What is the role of digital filtering in transformer protection?

b) Derive the expression for linking of the frequency column matrix and the time samples column matrix as used in Discrete Fourier Transform

[3+8]

9a) What is the relaying criterion for generator loss-of-excitation as is normally used by a numerical relay? What parameters are to be input to the relay?

b)Draw the hardware layout of a numerical relay for processing the input parameters to the above relay. Indicate each block clearly alongwith its function.

[5+6]