# GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 710707N   **Date: 24-06-2014**

Subject Name: Modern Power System Protection

Time: 02:30 pm - 05:00 pm   **Total Marks: 70**

Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What are the merits and demerits of digital relays over electromechanical/static relays?   **07**

(b) Discuss: Sampling theorem and Aliasing Error.   **07**

Q.2 **(a)** Draw generalized block diagram of a digital protective relay and explain the following components : (1) Analog Filtering (2) Sample and Hold Circuit   **07**

(b) Draw and discuss flowchart for determination of Primary-backup relay pairs using LINKNET structure.   **07**

OR

(b) Explain: Successive Approximation A/D converter.   **07**

Q.3 **(a)** Using LINKNET structure, find the backup relays for primary relays 2 and 6 in the system shown in fig. below.   **07**
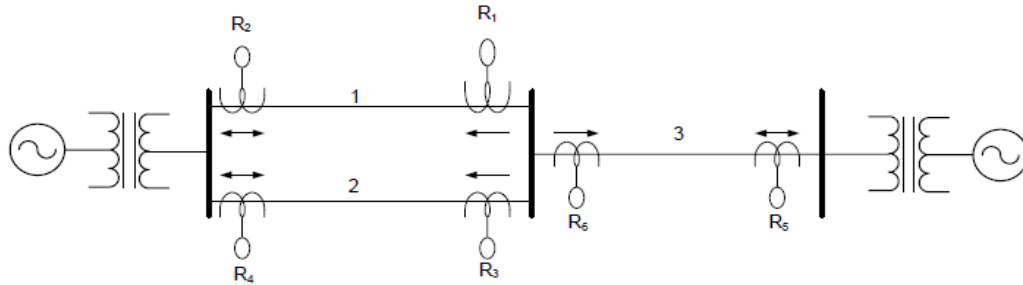
(b) What is relay coordination? Why is it important? Fig. shows single line diagram of a radial **07** system.
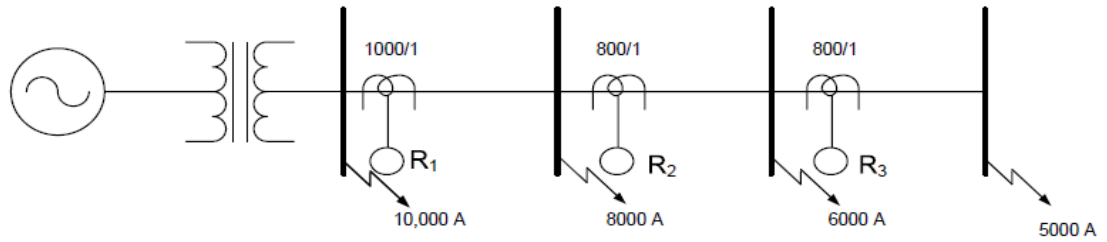
Plug Setting and TDS of relay R_3 is 75% and 0.1respectively. If the relay operating time is given by

$$t_{op} = [0.14/\{(PSM)^{0.02} -1\}] \times TDS$$

Determine the settings of relays R_1 and R_2. The normal range of PS is 50-200% in seven equal steps, whereas the TDS range is 0.1 to 1 in steps of 0.05.

OR

Q.3 (a) Discuss how the frequency gets affected due to loss of generators in a system? Why does load **07** shedding become necessary?

(b) Discuss the criteria which must be considered for designing load shedding schemes. **07**

Q.4 (a) Explain Single shot reclosing operation with breaker contacts operation during the cycle. **07**

(b) Why automatic reclosing is employed? Discuss the following points with respect to reclosing **07** systems.
(1) Instantaneous Trip Lock-out
(2) Synchronism Check
(3) LLDB/LBDL control

OR

Q.4 (a) Discuss the concept of Adaptive relaying. **07**

(b) Explain how least square technique is used for digital power system protection. Also discuss **07** Integral Least Square fit technique.

Q.5 (a) Explain the concept of Fourier Analysis based algorithms for digital relays. Also explain full **07** cycle window algorithm.

(b) Discuss: Digital harmonic filtering with selected limits. **07**

OR

Q.5 (a) Why series compensation is provided? Discuss briefly fault with un-bypassed series capacitors. **07**

(b) Explain the concept of travelling wave based protective scheme. **07**

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