

CBCS Scheme

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16/17EPS14

First Semester M.Tech. Degree Examination, Dec.2017/Jan.2018

Computer Relaying for Power System

Time: 3 hrs.

Max. Marks: 80

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the benefits obtained from computer relaying in power systems. (08 Marks)
b. Describe the functions of subsystems of computer relays with the help of a block diagram. (08 Marks)

OR

- 2 a. Define dependability and security in relaying literature. (03 Marks)
b. Describe the functional classification of relays. (05 Marks)
c. Explain the principle of operation of :
i) Electronic current transformer
ii) Electronic voltage transformer. (08 Marks)

Module-2

- 3 a. Given a periodic signal with fundamental frequency ω_0 , the exponential Fourier series is written as : $r(t) = \sum_{k=-\infty}^{\infty} e_k e^{jk\omega_0 t}$ obtain the sine and cosine Fourier series for the same. (06 Marks)
b. Define Walsh functions. (02 Marks)
c. Explain the properties of Fourier transforms. (08 Marks)

OR

- 4 a. Obtain the solution of the following constant co-efficient difference equation for a unit step in put, using Z – transforms $x(n) + \left(\frac{5}{4}\right)x(n-1) + \frac{3}{8}x(n-2) = y(n-1) + 4y(n-2)$ (06 Marks)
b. Describe the digital filters synthesis, given the magnitude specification for a low-pass filters. (04 Marks)
c. Briefly describe the artificial intelligence techniques used in solving existing protection problems. (06 Marks)

Module-3

- 5 a. State the features included in the symmetrical component distance relaying program (SCDR), giving the flow chart. (10 Marks)
b. Develop a recursive form of full-cycle Fourier algorithms. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain power transformer algorithm with flux restraint for the percentage differential relay. (08 Marks)
b. Briefly explain digital bus protection. (08 Marks)

Module-4

- 7 a. Describe the surge withstand capability test on relays with oscillatory SWC test specifications. (06 Marks)
b. Describe the supplementary equipment included in computer based protection. (06 Marks)
c. Briefly explain control applications derived from relay algorithms. (04 Marks)

OR

- 8 a. Explain the technique used for measurement of frequency and rate of change of frequency, that uses three phase voltages. (08 Marks)
b. Explain how digital relays can be used for monitoring functions in the power system. (04 Marks)
c. State the issues that are influenced by the hardware considerations. (04 Marks)

Module-5

- 9 a. Explain travelling wave distance relay concept with zero impedance in fault and source, also for inductive termination. (10 Marks)
b. Describe WAMS architecture with hierarchy of PMUs and PDCs. (06 Marks)

OR

- 10 a. Explain fault location based on travelling waves. (06 Marks)
b. Define adaptive relaying and explain how protection system can be made more dependable and server under vary of system operating conditions, by the adaptive relaying. (10 Marks)
