Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 11231

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Second Semester

Power Systems Engineering

PS 4201 – ADVANCED POWER SYSTEM PROTECTION

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What will happen if the sampling frequency is less than the Nyquist limit?
2. Define: Least Error Squared (LES) technique.
3. Mention the effects of harmonics on the performance of the amplitude comparator.
4. Why is it necessary to extract the fundamental frequency components from the complex fault relaying signals?
5. Why is over-fluxing harmful for the transformer?
6. How will you detect the loss of prime mover in generator?
7. Differentiate: IDMT and DMT relays.
8. How to create time discrimination between two relays?
9. List out the different softwares used to analyze the short circuit studies.
10. Write the challenges to design a PC based protective relaying schemes.

PART B — (5 × 13 = 65 marks)

11. (a) With the help of neat block diagram, discuss the functions of various blocks involved in digital protection relay and mention the advantages of numerical relays over conventional relays.

Or

(b) Describe the construction and operation of numerical over current relay by using microprocessor. (6+7)

12. (a) Discuss the hardware and software realization of digital relay for transmission line protection. (6+7)

Or

(b) What is the necessity of protecting electrical equipment against travelling waves? Describe in brief the protective devices used for protection against such waves. (6+7)

13. (a) Write the concept of differential protection. Discuss how to implement digital operated differential protection scheme for *Star/Delta* connected – three phase transformer using suitable diagram.

Or

(b) Discuss the various types of faults encountered in synchronous generator. Implement the digital protection against stator inter-turn faults in generator using suitable diagram. (6+7)

14. (a) Discuss the process of distance relay coordination with suitable example.

Or

(b) Mention the features of Integrated operation of national power system. Discuss the role of Man-machine interface and computer graphics in modern power system protection.

15. (a) Discuss the various steps involved to design an algorithm for short circuit studies and also write the assumptions to consider for designing an algorithm.

Or

(b) Discuss the protection of the high voltage long transmission from the travelling waves by using ultra-high speed protective relays and also write the fault identification process in transmission line by using ultra-high speed relay.

PART C — (1 × 15 = 15 marks)

16. (a) Investigate why a MHO relay is preferred for the protection of long lines against phase faults, where as a reactance relay is preferred for short lines against ground fault by using suitable operating characteristics.

Or

(b) Analyze the performance of modern power system protection schemes with the conventional protection schemes and also discuss the role of AI techniques in the future of digital protection schemes.
