



Reg. No. :

--	--	--	--	--	--	--	--	--	--	--

Question Paper Code : X86869

M.E./M.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Second Semester
Power Systems Engineering
PS 5203 – ADVANCED POWER SYSTEM PROTECTION
(Regulations 2017)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

1. Differentiate between internal and external fault.
2. How will you adjust the MTA of a directional relay ?
3. Which harmonic is the most dominant in the inrush waveform ?
4. Define stability ratio of high impedance bus bar differential scheme.
5. Describe the situations where DTOC relays are preferred over IDMT relays.
6. Draw the R-X diagram for reactance relay.
7. Why the conventional differential protection unable to detect inter-turn faults on the same phase ?
8. Define sympathetic inrush current.
9. Explore the needs of digital filtering in power system relaying.
10. Define the concept of wavelet analysis and how it will be used for numerical protection.

PART – B

(5×13=65 Marks)

11. a) Explain the following with neat sketch.
 - i) HRC fuse and its current versus time characteristics. **(5)**
 - ii) Thermal relay. **(4)**
 - iii) Plug setting and time sitting in over current relay. **(4)**

(OR)

- b) Explain construction of different types of over current protection relays and its characteristics.



12. a) Sketch the high impedance bus bar differential protection for a three phase bus bar having four incoming and 5 outgoing feeders.

(OR)

- b) Explain the high impedance bus bar differential protection scheme and derive the expression for maximum external fault current up to which the differential protection scheme remains stable and minimum fault current that can be detected by the scheme.

13. a) Explain in detail about Carrier Aided Distance schemes for acceleration of zone.

(OR)

- b) Discuss about various protection schemes of FACTS devices.

14. a) Explain the different abnormal operating conditions of turbo alternator and its protection against abnormal operating conditions.

(OR)

- b) Explain in detail about the injection method of generator protection with neat sketch.

15. a) Explain numerical transformer differential protection scheme with suitable example.

(OR)

- b) Explain in detail about the numerical distance protection of transmission line.

PART – C

(1×15=15 Marks)

16. a) Design the differential protection for a three-phase, 50 Hz transformer with the following nameplate ratings : 250 MVA, Voltage : 15.75 kV/400 kV, Frequency : 50 Hz, Connection : Delta-star.

(OR)

- b) Consider a single-phase 11 kV/11 kV, 1.1 MVA transformer protected by percentage differential protection. CTs with 5A secondaries are used. It is known that the magnetizing currents of the two CTs, for maximum external fault current, differs by 0.5A. Assuming no other source of error and a minimum pickup of 0.01A. Find the minimum percentage bias setting so that the scheme remains stable on maximum external fault current.
-