

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Summer 2018 - 19 Examination

Semester: 2

Subject Code: 203207152

Subject Name: Digital Protection of Power System

Date: 06/05/2019

Time: 10:30am To 01:00pm

Total Marks: 60

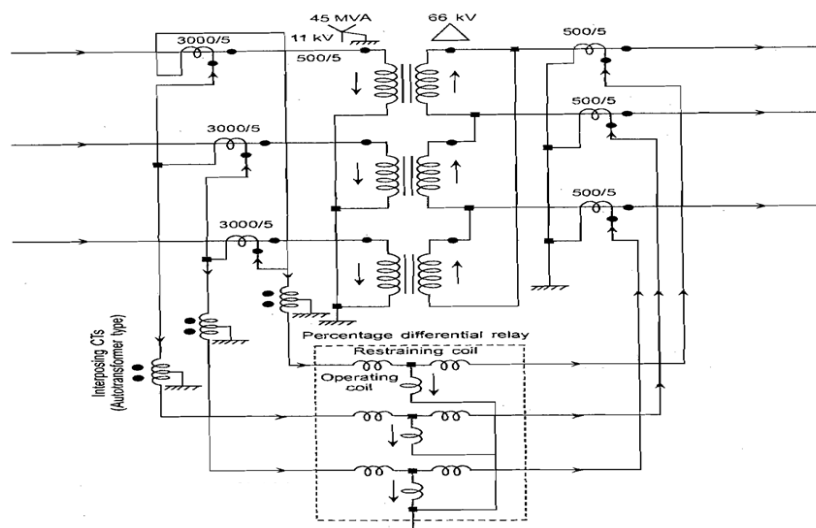
Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) Discuss various zones of protection for a modern power system. Explain primary and back-up protection. (05)
- B) Find the fourth element of the Walsh function having the order of 5 and length $N = 8$, i.e., $Wal(5,4)$. (05)
- C) Explain phenomena of Magnetic Inrush with respect to power transformer. (05)
- Q.2** Answer the following questions. (Attempt any three) (Each five mark) (15)
- A) Explain the concept of Fourier analysis based algorithms for digital relays.
- B) Compare IIR and FIR filters.
- C) Discuss: Sampling theorem and Aliasing Error.
- D) What is the concept of Least Square Error based technique with reference to relay algorithms? Explain in detail.
- Q.3** A) Draw the block diagram of digital overcurrent relay and explain its working with flow chart. (07)
- B) What is analog to digital conversion? What are the types of analog to digital converter? Explain Dual Slope A/D converter in detail. (08)

OR

- B) For a 45 MVA, 11/66 kV, Star-Delta transformer as shown in figure below, design percentage differential protection scheme considering following data: (08)
- Allowable overload: 25%
 - CT ratio: 3000:5 (For 11 kV side) and 500:5 (For 66 kV side)
 - Assuming slope of 40% for spill current calculation



- Q.4** A) What components are included in Signal Conditioning Subsystem of digital relay? Explain each in detail. (07)

OR

- A) What is Finite Difference Techniques? Explain about (07)
- (i) Forward Difference, (ii) Backward Difference and (iii) Central Difference.
- B) Discuss in detail about Fourier Transform method used in protection algorithm of a digital relay. (08)