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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, February - 2023
POWER SYSTEM PROTECTION
(Electrical and Electronics Engineering)

Time: 3 Hours   **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a) What is primary and back – up protection? [2]
 b) Draw and explain the basic components of a protection system in brief. [3]
 c) What is an impedance relay? Explain its operating principle. [2]
 d) Distinguish between current setting and time setting. [3]
 e) What is wire pilot protection? [2]
 f) How do you protect a bus bar? Give brief explanation. [3]
 g) List the limitations of Static relays. [2]
 h) Explain how microprocessor-based relays are different from electromechanical relays. [3]
 i) Define the term Fuse and explain its usage. [2]
 j) Explain different ratings of circuit breakers. [3]

PART – B

(50 Marks)

2. Explain the following protective schemes in brief:
 a) Overcurrent protection
 b) Distance Protection
 c) Carrier – current protection
 d) Differential Protection. [10]

OR

3. Explain the basic principle of operation of electromagnetic relay. State different types of electromagnetic relays. [10]

4.a) What are the various overcurrent protective schemes? Discuss their merits, demerits and field of applications.
 b) An earth-fault starting relay has a setting of 35%, and a current rating of 5 A. It is connected to a CT of ratio 500/5. Calculate pick-up current in primary for which the earth fault relay operates. [6+4]

OR

5.a) Discuss how (i) an electromechanical and (ii) a static MHO relay is realized. Explain its characteristic on the R-X diagram.
 b) Explain the effect of power swings on the performance of distance relays. [6+4]

6. What is carrier aided distance protection? What are its different types? Discuss the permissive under-reach transfer tripping scheme of protection. [10]

OR

7.a) What type of protective device is used for the protection of an alternator against overheating of its (i) stator, (ii) rotor? Discuss them in brief.

b) A three-phase, 132 kV/33 kV star-delta connected power transformer is protected by differential protection scheme. Determine the ratio of CTs on the HV side of the transformer, if that on the LV side is 300/5. How are the CT secondaries connected?

[6+4]

8. Explain the following types of Static Amplitude comparators:
   a) Integrating comparators and
   b) Instantaneous comparator. [5+5]

OR

9. Explain the working of static IDMT over current relay with a neat block diagram. [10]

10. What is an Arc Interruption and explain the following methods of Arc Interruption
    a) High resistance interruption and
    b) Current zero interruption. [5+5]

OR

11.a) Explain the operation of H. V. D. C. circuit breakers.
   b) Explain the working of SF_6 Circuit breaker with a neat circuit diagram. [5+5]

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