

CBCS SCHEME

18EE72



Seventh Semester B.E. Degree Examination, Feb./Mar.2022 Power System Protection

Max. Marks: 100

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

Module-1

- 1 a. With a neat diagram, explain zones of protection in a power system. (06 Marks)
- b. Discuss the essential qualities of a protective relay. (08 Marks)
- c. Explain various methods of back up protection. (06 Marks)

OR

- 2 a. Define the following terms :
 - (i) Relay
 - (ii) Operating force
 - (iii) Pick up level
 - (iv) Reset
 - (v) Current setting(10 Marks)
- b. Write a short note on Automatic reclosure. (05 Marks)
- c. Write the advantage and disadvantages of the static relay. (05 Marks)

Module-2

- 3 a. What is an impedance relay? Explain its operating principle, torque equation and operating characteristics of impedance relay. (08 Marks)
- b. Explain the operating principle of reverse power or directional relay with neat diagram. (06 Marks)
- c. Why IDMT relays are widely used for over current protection? (06 Marks)

OR

- 4 a. Discuss a protection scheme for parallel feeder. (06 Marks)
- b. Distinguish between earth fault relay and an over current relay. (06 Marks)
- c. Write and explain 3 stepped distance protection of transmission line. (08 Marks)

Module-3

- 5 a. Define the term pilot with reference to power line protection. List the different types of wire pilot protection scheme and explain any one of the scheme. (08 Marks)
- b. Explain balanced (opposed) voltage differential protection. (06 Marks)
- c. The neutral point of a 11 KV an alternator is earthed through a resistance of 12Ω the relay is said to operate when there is out of balance of a 0.8 A. The CT's have a ratio of 2000/5. What percentage of the winding is protected against earth fault? What must be the minimum value of earthing resistance required to give 90% of protection to earth phase. (06 Marks)

OR

- 6 a. With a neat sketch explain the working of frame leakage protection used for bus-zone protection. (08 Marks)
- b. With neat diagram, explain construction and operation of Burhholz relay. (12 Marks)

Module-4

- 7 a. With a neat sketch, explain the recovery rate theory and energy balance theory of arc interruption in a circuit breaker. (10 Marks)
- b. Explain the terms: restriking voltage, recovery voltage and RRRV. Derive expression for restriking voltage and RRRV in terms of system voltage, inductance and capacitance. (10 Marks)

OR

- 8 a. What are the different types of air blast circuit breaker? Discuss their operating principle and area of application. (08 Marks)
- b. With a neat sketch, explain the direct testing of circuit breaker. (06 Marks)
- c. What are the merits and demerits of SF₆ circuit breaker? (06 Marks)

Module-5

- 9 a. Define the following terms:
 (i) Fuse
 (ii) Fuse element
 (iii) Rated current
 (iv) Minimum fusing current
 (v) Fusing factor. (06 Marks)
- b. Describe the construction and operation of the HRC cartridge fuse with indicator. Write applications of the HRC fuse. (08 Marks)
- c. Write discrimination between fuse and over-current protective devices. (06 Marks)

OR

- 10 a. Write note on Klydonograph and magnetic link. (08 Marks)
- b. What is a Gas Insulated Substation? Discuss its advantages and disadvantages as compared to conventional air insulated substation. (08 Marks)
- c. Write short note on Arcing horn with diagram. (04 Marks)
