



# CBCS SCHEME

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18EE72

## Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024 Power System Protection

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Discuss briefly the role of protective relay in a modern power system. (06 Marks)
- b. Explain the nature and causes of faults. Discuss the consequences of faults on a power system. (08 Marks)
- c. Draw a neat sketch of an induction disc relay and explain its operating principle. (06 Marks)

OR

- 2 a. Explain the working principle, types and application of thermal relays. (06 Marks)
- b. What is numerical relay? What are its advantages over conventional type relays? (06 Marks)
- c. Explain various types of overcurrent relays with its characteristic curve. (08 Marks)

### Module-2

- 3 a. What are the various overcurrent protective scheme? Explain their merits, demerits and field of application. (07 Marks)
- b. Describe the operating principle, constructional features and area of application of reverse power or directional relay. (07 Marks)
- c. Distinguish between an earth fault relay and an overcurrent relay. Explain various methods to energize an earth fault relay. (06 Marks)

OR

- 4 a. Explain the impedance relay with its operating principle. (06 Marks)
- b. Explain stepped time-distance characteristics of three distance relaying units used for I, II and III zone of protection. (08 Marks)
- c. Discuss the effect of arc resistance on the performance of different types of distance relays. (06 Marks)

### Module-3

- 5 a. What are the important operating principles used in wire pilot schemes? Explain Transley scheme of wire pilot protection. (07 Marks)
- b. Describe the behaviour of simple differential protection scheme during normal, external and internal fault. (08 Marks)
- c. Explain balanced voltage differential relaying scheme. (05 Marks)

OR

- 6 a. Describe with neat sketch, the percentage differential protection of a modern alternator. (08 Marks)
- b. Explain with neat diagram the working of Buchholz relay. (07 Marks)
- c. Discuss buszone protection with neat diagram. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. With a neat sketch, explain the recovery rate theory and energy balance theory of arc interruption in a circuit breaker. (08 Marks)
- b. Explain the interruption of capacitive current with neat sketch and waveform. (06 Marks)
- c. Discuss the working of air blast circuit breaker. (06 Marks)

**OR**

- 8 a. Explain with neat diagram the direct testing of circuit breaker. (06 Marks)
- b. With a neat sketch, explain the construction and working of non-puffer type SF6 circuit breaker. (08 Marks)
- c. Write short notes on HVDC circuit breaker. (06 Marks)

**Module-5**

- 9 a. Explain the construction and operation of the HRC cartridge fuse. What are its advantages and disadvantages? (10 Marks)
- b. Explain with neat figure:
- (i) Rod gap arrestor
- (ii) Expulsion type arrestor (10 Marks)

**OR**

- 10 a. Explain the term insulation coordination. Describe the construction of volt time curve and terminology associated with impulse testing. (10 Marks)
- b. What are the various components of GIS? Briefly describe their functions. (10 Marks)

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