

THE KAVERY ENGINEERING COLLEGE  
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

*Sixth Semester*

*Electrical and Electronics Engineering*

EE3601 - Protection and Switchgear

*Regulations - 2021*

*Duration : 3 Hrs*

*Maximum : 100 Marks*

**PART - A (ANSWER ALL QUESTIONS) (Marks 10\*2=20)**

| <i>Q.No</i> | <i>Questions</i>                                                                                                                                                            | <i>BLT</i> | <i>CO</i> | <i>Marks</i> |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 1.          | What are the causes of faults in a power system?                                                                                                                            | UN         | 1         | 2            |
| 2.          | List the different types of earthing.                                                                                                                                       | RE         | 1         | 2            |
| 3.          | Find the plug setting multiplier when circuit carries a fault current of 4000A. When, a relay is connected to 400/5 ratio current transformer with current setting of 150%. | AP         | 2         | 2            |
| 4.          | List out the different types of distance relay.                                                                                                                             | RE         | 2         | 2            |
| 5.          | The secondary of CT should not be kept opened. Justify.                                                                                                                     | UN         | 3         | 2            |
| 6.          | Recall the concept of ring feeder.                                                                                                                                          | RE         | 3         | 2            |
| 7.          | Compare static relays with electromagnetic relays.                                                                                                                          | RE         | 4         | 2            |
| 8.          | What are the basic circuits used in static relays?                                                                                                                          | RE         | 4         | 2            |
| 9.          | Why oil circuit breakers are not suitable for heavy current interruption at low voltages?                                                                                   | UN         | 5         | 2            |
| 10.         | Find the rated making current for a 3 Phase oil circuit breaker rated as 1500 A, 1000 MVA and 3 second operating time.                                                      | AP         | 5         | 2            |

**PART - B (ANSWER ALL QUESTIONS) (Marks 5\*13 = 65)**

| <i>Q.No</i> | <i>Questions</i>                                                                                                                                                   | <i>BLT</i> | <i>CO</i> | <i>Marks</i> |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 11.         | a Construct the importance of protective schemes employed in power system.                                                                                         | AP         | 1         | 13           |
|             | Or                                                                                                                                                                 |            |           |              |
|             | b Model the protective zone diagram for a sample power system networks.                                                                                            | AP         | 1         | 13           |
| 12.         | a Analyze the operating principle, construction and application of IDMT non directional over current relay with neat diagram and also derive the Torque equations. | AP         | 2         | 13           |
|             | Or                                                                                                                                                                 |            |           |              |
|             | b Analyze the construction, operating principle and application of distance type impedance relay with R-X diagram.                                                 | AP         | 2         | 13           |
| 13.         | a Summarize the working principle of various types of differential relay with necessary diagrams.                                                                  | UN         | 3         | 13           |
|             | Or                                                                                                                                                                 |            |           |              |
|             | b Explain the protection of generator using percentage biased differential protection and restricted earth fault schemes.                                          | UN         | 3         | 13           |

|     |   |                                                                                                                          |    |   |    |
|-----|---|--------------------------------------------------------------------------------------------------------------------------|----|---|----|
| 14. | a | Demonstrate the operation of static over current relay with neat diagram.                                                | UN | 4 | 13 |
|     |   | Or                                                                                                                       |    |   |    |
|     | b | Explain the working principle of numerical relay with necessary block diagram.                                           | UN | 4 | 13 |
| 15. | a | Develop an expression for re-striking voltage and RRRV of circuit breaker in terms of system inductance and capacitance. | AP | 5 | 13 |
|     |   | Or                                                                                                                       |    |   |    |
|     | b | Make use of block diagram to interpret the construction and operation of SF <sub>6</sub> circuit breaker.                | AP | 5 | 13 |

*PART – C (Marks 1\*15 = 15)*

| <i>Q.No</i> |   | <i>Questions</i>                                                                                                                                                                                                                                                                                          | <i>BLT</i> | <i>CO</i> | <i>Marks</i> |
|-------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----------|--------------|
| 16.         | a | In a 132 kV system, the reactance per phase up to the location the circuit breaker is 5Ω and capacitance to earth is 0.03μF. Solve:<br>(a) The maximum value of the re-striking voltage across the contacts of the circuit breaker<br>(b) Frequency of transient oscillation<br>(c) Maximum value of RRRV | AP         | 5         | 15           |
|             |   | Or                                                                                                                                                                                                                                                                                                        |            |           |              |
|             | b | Make use of block diagram summarize the construction and working principle of air blast circuit breaker.                                                                                                                                                                                                  | AP         | 5         | 15           |