



# BRAINWARE UNIVERSITY

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Barasat, Kolkata - 700125

Term End Examination 2023-2024

Programme – Dip.EE-2021

Course Name – Switchgear and Protection

Course Code - DEE504

( Semester V )

Full Marks : 60

Time : 2:30 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) Explain the protection system which compares the electrical quantity that enters and leaves any zone and then operates is:
- |                                   |                     |
|-----------------------------------|---------------------|
| a) Balanced voltage               | b) Balanced current |
| c) Differential protection system | d) All of these     |
- (ii) The correct statement about the unbalanced condition in alternator
- |   |   |
|---|---|
| a) The same current flows through different phases in the unbalanced alternator | b) Unbalanced loading is not dangerous for the alternator |
| c) Unbalanced loading introduces eddy current in the alternator                 | d) None of these is correct                               |
- (iii) For single frequency transients, the ratio of peak restriking voltage to time between voltage zero and peak voltage is called
- |                                      |                            |
|--------------------------------------|----------------------------|
| a) Restriking voltage                | b) Recovery voltage        |
| c) Rate of rising restriking voltage | d) Active recovery voltage |
- (iv) Define Fault diverters are basically
- |                     |                  |
|---------------------|------------------|
| a) Circuit breakers | b) Fast switches |
| c) Relays           | d) Fuses         |
- (v) Define SF6 gas
- |   |  |
|---|--|
| a) is lighter than hydrogen                       | b) is lighter than air                             |
| c) has density 2-times as compared to that of air | d) has density 5 times as compared to that of air. |
- (vi) Illustrate the breaking capacity of the circuit breaker is in \_\_\_\_\_ and is measured in \_\_\_\_\_
- |               |               |
|---------------|---------------|
| a) R.M.S, kVA | b) R.M.S, MVA |
|---------------|---------------|

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- c) Peak, kVA
- d) Peak, MVA
- (vii) For motor circuit breakers, the time of closing the cycle is
  - a) 0.001 sec
  - b) 0.01 sec
  - c) 0.10 sec
  - d) 0.003 sec.
- (viii) Define A relay used for the protection of motors against overload is
  - a) Impedance relay
  - b) Electromagnetic attraction type
  - c) Thermal relay
  - d) Buchholz's relay.
- (ix) Define The fusing factor of a fuse is mathematically defined by the equation:
  - a) Current rating of fuse \* 4.44
  - b) 1/Current rating of the fuse
  - c) Min fusing current / Current rating of the fuse
  - d) Min fusing current \* Current rating of the fuse
- (x) Define the advantage of grounding a power system is that
  - a) Earth fault current can be used
  - b) Arcing ground phenomenon is avoided
  - c) It provides symmetry to the line impedances
  - d) Both Earth fault current can be used and Arcing ground phenomenon is avoided
- (xi) Discuss The component that provides a signal to the circuit breaker under the fault condition
  - a) Isolator
  - b) Fuse
  - c) Relay
  - d) CT
- (xii) Explain relay is used to
  - a) Break the fault current
  - b) Since the fault
  - c) Since the fault and direct to trip the circuit breaker
  - d) All of these
- (xiii) Define the Desired tripping of a circuit breaker is
  - a) Manually
  - b) Automatically
  - c) That it should give warning
  - d) None of these
- (xiv) Illustrate H.R.C. fuses has
  - a) High rating of current
  - b) High rupturing capacity
  - c) High resistance capacity
  - d) None of these
- (xv) Define Which circuit breaker is preferred to be installed in an extra-high voltage AC system.
  - a) Air blast circuit breaker
  - b) SF6 circuit breaker
  - c) Bulk oil circuit breaker
  - d) Minimum oil circuit breaker

**Group-B**

(Short Answer Type Questions)

3 x 5=15

- 2. Describe the term Current Setting in Relay. (3)
- 3. Describe the induction relay application. (3)
- 4. Define the meaning of the operating time of a protective relay. (3)
- 5. Explain What is biased differential bus zone reduction (3)
- 6. Describe peak up current in the relay. (3)

**OR**

Evaluate the difference between fuse and breaker. (3)

**Group-C**

(Long Answer Type Questions)

5 x 6=30

- 7. Explain with a diagram the operating principle of reactance relay. (5)

8. Explain what is the main protection required for transmission lines and describe all protection with a diagram. (5)
9. Explain What is primary protection. (5)
10. Explain What fluxing protection is in the transformer. (5)
11. Explain current chopping considered as a serious drawback in a circuit breaker. (5)
12. Explain the advantages of the SF6 Circuit Breaker. (5)

**OR**

Describe the operating principle of the watt-hour meter structure ( Non-directional relay with proper diagram) (5)

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