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**END SEMESTER REGULAR / RETEST
EXAMINATION, JULY – 2023**

Branch : Electrical

Semester : 6th

Subject Code : El – 603 (New&Old)

SWITCHGEAR AND PROTECTION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

● **Instruction :**

All questions of PART–A and PART–B are compulsory.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10
- (a) For greater flexibility, _____ bus-bar system is used.
- (b) A fuse has _____ time current characteristics.

[Turn over

(c) An A.C. circuit is more easily interrupted than a D.C. circuit because alternating current provides about every half cycle.

(d) Capacitive current breaking results in voltage surge.

(e) The Translay scheme is essentially a balance system.

(f) Peterson coil is used for grounding.

(g) Back up protection functions when the primary protection fails to operate.

(h) A device used for connecting a conductor to the earth is known as main switch.

(i) Buchholz relay is connected between transformer and CB.

2. Write True or False : $1 \times 10 = 10$

(a) Current chopping leads to dangerously high voltages. ✓

(b) SF_6 gas is not an efficient quenching medium because of its negativity. ✗

(c) Current chopping phenomenon is absent in ABCB.

(d) For the same rupturing capacity, the actual current to be interrupted by an HRC fuse is much more than that of any circuit breaker.

(e) Buchholz relay can detect faults above oil level in the transformer.

(f) A rod gap arrester is capable of stopping power frequency currents to earth.

(g) Relays using induction disc type principle operate both on AC and DC systems.

(h) Arcing ground is also called earth fault.

(i) In transmission lines, the ground wire runs below the line conductors.

(j) Differential protection scheme for longer lines is costly.

3. Choose the correct answers : $1 \times 5 = 5$

(a) A switchgear is a device for

(i) interrupting an electrical circuit

(ii) switching an electrical circuit

(iii) switching and controlling an electrical circuit

(iv) switching, controlling and protecting the electrical circuit and equipment

(b) An isolator

- (i) is an automatic device for breaking a circuit
- (ii) is a relay operated device for breaking a circuit
- (iii) opens a circuit under no load
- (iv) opens a circuit under load

(c) A fuse blows off by

- (i) melting (ii) burning (iii) arcing

(d) Under fault conditions, the information to the circuit breaker is provided by

- (i) Rewirable fuse (ii) HRC fuse
- (iii) Surge arrester (iv) Relay

(e) Which is the worst fault for a power system ?

- (i) Single line-to-ground fault
- (ii) Double line-to-ground fault
- (iii) Line-to-line fault
- (iv) Symmetrical fault.

PART – B

Marks – 45

4. Compare between : 3+3+3=9

- (a) Isolator and Circuit breaker
- (b) Fault and Abnormality
- (c) Short circuit and Overload.

5. (a) Describe with a neat diagram the operation of :

(i) SF 6 Circuit Breaker. 5

Or

(ii) Air Blast Circuit Breaker. 5

(b) Explain the high resistance method of an Arc interruption. 4

Or

Define the following terms associated with circuit breaking : 2+2=4

- (i) Recovery Voltage
- (ii) Restriking Voltage.

6. (a) Explain the working principle of :

(i) Non-Directional Overcurrent Relay with a neat diagram. 6

Or

(ii) Differential Relay. 6

(b) Define the terms associated with protective relaying : 3

(i) Pick-up current

(ii) Reset Value.

7. (a) Explain :

(i) Distance protection scheme used on transmission lines. 6

Or

(ii) Restricted Earth Fault protection scheme of Alternators. 6

(b) Why is differential protection not used for long transmission lines ? 3

8. (a) List the different methods of Neutral Grounding. 3

(b) Explain :

(i) the use of Rod gaps and Horn gaps for protection against Overvoltages. 6

Or

(ii) the operating mechanism of a Valve Type Arrester. 6