Roll No. ☐☐☐☐☐☐☐☐☐☐   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (EE/EEE) (Sem.–6ᵗʰ)

POWER SYSTEM-II
(SWITCHGEAR & PROTECTION)

Subject Code : EE-306

Paper ID : [A0421]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a. Explain need of grounding.

   b. Which faults occurring on overhead lines are most frequent and severe?

   c. What are the methods of arc extinction in oil circuit breakers?

   d. Draw current graded protection diagram for a radial feeder.

   e. What are the factors affecting C.B. recovery voltage?

   f. The normal frequency _____ voltage across the C.B. contacts after final arc extinction is termed as _____ .

   g. Draw circuit symbols of transformer, induction motor, dc motor, circuit breaker.

   h. GIS stands for _____ . Give one property of the insulating agent.

   i. PSM is the ratio of _____ current referred to CT secondary to the _____ current.

   j. Explain principle of surge absorber.

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SECTION-B

2. Derive an expression for Rate of Rise of Restriking Voltage across the Circuit Breaker terminals.

3. Explain principle of Air-Blast Circuit Breaker and draw and explain its diagram.

4. Explain protection of transmission line against lightning overvoltages.

5. Explain percentage differential protection scheme of an alternator.

6. Draw and explain High Rupturing Capacity Cartridge fuse.

SECTION-C

7. A generator connected through 4 cycle C.B. to a transformer is rated 7000kVA, 24kV (line-to-line r.m.s.) with reactances of $X_d = 8\%$, $X_d = 15\%$, $X_d = 90\%$. It is operating at no-load and rated voltage when a three phase short circuit occurs between the breaker and the transformer. Determine :

    (a) sustained short circuit current in the breaker.

    (b) the initial symmetrical r.m.s. current in the breaker.

    (c) maximum possible dc component of the short circuit current.

    (d) the momentary current rating of the breaker.

8. Explain distance protection of lines, considering :

    (a) equal impedances

    (b) unequal impedances of the sections between bus bars.

9. Explain in detail the substation layout for one-and-a-half breaker bus bar arrangement.