R19

IV B.Tech I Semester Advance Supplementary Examinations, March - 2023
SWITCHGEAR & PROTECTION
(Electrical and Electronics Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
ONE Question from Each unit
All Questions Carry Equal Marks
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UNIT I

1 a) Describe the operating principle of an air blast circuit breaker with the help of a diagram. [7]

b) Discuss principle of arc interruption in an oil circuit breaker. [8]

(OR)

2 a) Develop the expression for rate of rise of restriking voltage. [7]

b) In a short circuit test on 220kV, 3-ph CB with earthed neutral the following results were obtained: fault pf=0.3, recovery voltage=0.9 of full line value, the breaking current is symmetrical and the restriking transient had a neutral frequency of 15kHz. Determine RRRV, assuming that short circuit is an earthed fault. [8]

UNIT II

3 a) Compare R-X characteristics of impedance relay, reactance relays and mho relays. [7]

b) Show that the torque on the disc of an induction relay is maximum when the phase difference between the two fluxes is 90 deg. And also write the merits and demerits of static relays. [8]

(OR)

4 a) Explain with a neat sketch the operation of an induction type over current relay. What are the functions of current and time multiplier settings associated with such relay? [7]

b) Classify the types of over current relays and discuss their applications [8]

UNIT III

5 a) Explain briefly about stator fault protection in generator   [7]
   b) The primary of a transformer winding has 1000 turns while secondary has 500 turns. If the primary CT ratio is 100:5, find the CT ratio required in the secondary side to establish circulatory current scheme.   [8]

(OR)

6 a) How do you protect transformer against incipient faults?   [7]
   b) A 50 MVA, 3 phase, 33 kV synchronous generator is protected by the Merz-Price protection using 1000/5 ratio CTs. It is provided with restricted earth fault protection with the earthing resistance of 7.5 Ω. Calculate the percentage of winding unprotected in each phase against earth faults if the minimum operating current of the relay is 0.5 A.   [8]

UNIT IV

7 a) Explain with diagram the high impedance bus bar differential protection scheme.   [7]
   b) Explain with the aid of circuit and phasor diagrams the function of a Peter-son coil in a 3-phase system. What are permissible practical deviations from resonance in the tuning of the Peterson coil?   [8]

(OR)

8 a) Explain the principle of operation of a Translay Relay protection for feeders   [7]
   b) Explain 3-zone distance protection of a transmission line   [8]

UNIT V

9 a) Explain the operation of numerical over current protection using numerical relays.   [7]
   b) Explain in detail about the internal causes of over voltages?   [8]

(OR)

10 a) What is lightning? Describe the mechanism of lightning discharge.   [7]
   b) A transmission line has a capacitance of 0.1 μF/ph. Calculate the inductance of the Peterson coil to neutralize the effect of capacitance of complete length of the line, 96% of the line and 85% of the line. Assume 50Hz supply and comment on result.   [8]