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(3 Hours)

[Total Marks : 100]

- N.B. :** (1) Question No. 1 is compulsory.
(2) Attempt any **four** questions out of **remaining six** questions.
(3) Assume **suitable** data and justify **clearly**.

MASPEN

1. (a) Discuss various parameters of protective relaying. 10
(b) Explain the following terms :— 10
 - (i) Arc extinction in A.C. circuit and D.C. circuit.
 - (ii) Making and Breaking capacity of circuit breaker.
2. (a) Explain the constructional details of HRC fuse. How arc is extinguished in HRC fuse ? State advantages of HRC fuse. 12
(b) Explain over-reach and under-reach in impedance relay and state the measure to overcome it. 8
3. (a) Explain the construction and working principle of an induction type over current relay. Derive torque equation for it. 10
(b) A 3 phase, 2 pole, 11 K.V., 10,000 KVA alternator has neutral earthed through a resistance of 7 ohms. The machine has current balance protection which operates upon out of balance current exceed 20% of full load. Determine % of winding protected against earth fault. 10
4. (a) Explain in detail construction and working principle of vacuum circuit breaker. 10
(b) Explain the phenomenon of current chopping, its effects and measures taken to reduce it, in the circuit breaker. 10
5. (a) Draw and explain three step distance relaying scheme for protection of transmission line. 10
(b) In a system the rms voltage is 19.1 kV, L is 10 mH, C is 0.02 μ F. Determine the average rate of rise of restriking voltage when the circuit breaker opens. 10
6. (a) Draw a schematic for motor protection against single phasing and explain its working in detail. 10
(b) Draw and explain the construction and working of the Buchholz Relay used for transformer protection. 10
7. Write short notes on any **three** :— 20
 - (a) Static and electromagnetic relays
 - (b) Construction and working of SF₆ circuit breaker.
 - (c) Resistance Switching
 - (d) Amplitude and phase comparators.