

- N.B.** (1) Question No. 1 is **compulsory**.
 (2) Solve any **four** questions out of **remaining**.
 (3) Assume the **suitable** data if **required** and specify the **same**.

Q 1. Answer the following questions:

[20]

- What is system load line
- What is a gradient factor? What are its uses?
- Discuss the corona effect in HVDC lines.
- Discuss the significance of volt time curve in power system.

Q No.2a) Discuss the various methods of voltage control. [10]

Q No.2b) A 25 MVA, 13.2 KV alternator with solidly grounded neutral has a sub transient reactance of 0.25 pu. The negative and zero sequence reactance are 0.35 pu and 0.1 pu respectively. A single line to ground fault occurs at the terminals of this unloaded alternator. Determine the fault current and line voltages V_b , V_c . [10]

Q No.3a) Derive the charge voltage relation for 2-conductor line configuration. [10]

Q No.3b) A wave of 11KV travels along the three phase transmission line of inductance 9.78×10^{-7} Henry and capacitance of 1.136×10^{-11} Farad and is terminated by a star connected load of 1000 ohms per phase. Calculate the line current, voltage across the terminating resistance, rate of power absorption, reflected voltage, rate of reflected energy and value of terminating resistance for no reflection. [10]

Q No.4a) Determine the corona critical disruptive voltage, visual critical voltage, power loss in fair weather and bad weather condition for a 3 phase line 160 km long, with conductor diameter 1.036cm, 2.44m delta spacing, air temperature 26.67 centigrade, altitude 2440 m, corresponding to an approximate barometric pressure of 73.15cm operating voltage 110 KV at 50 HZ. Assume $m=0.85, m_v=0.72$. [10]

Q No.4b) Discuss the short circuit of a synchronous machine under load and no load condition. [10]

Q No.5a) Discuss the surge protection of rotating machines and transformer. [10]

Q No.5b) Discuss the terms dynamic voltage rise, arrester location and arrester rating [10]

Q No.6a) Write an algorithm for short circuit study of system. [10]

Q No.6b) Discuss the phenomenon of arcing ground. [10]

Q No.7a) Discuss the sequence network and impedances of a synchronous machine. [10]

Q No.7b) Derive the Fortesques theorem for symmetrical component analysis. [10]