

**Duration – 3 Hours**

**Total Marks - 80**

N.B.: - (1) Question No.1 is compulsory.

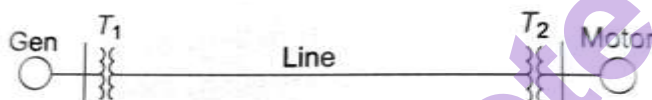
(2) Attempt any Three questions out of remaining five questions.

(3) Assume suitable data if necessary and justify the same.

Q 1. Answer all questions.

- A) State different types of Faults takes place in electrical power system and explain each in 2 sentences **05**
- B) Define with reference to Insulation coordination: 1. BIL 2. FOW **05**
- C) Discuss the role of bundle conductors in corona. **05**
- D) Why ground wires are provided on top of the Transmission lines? **05**

Q 2 a) A synchronous generator and synchronous motor each rated at 25 MVA and 11KV having 15 % sub transient reactance are connected through transformer and line as shown. The transformer is rated for 25 MVA 11/66 KV and 66/11 KV with leakage reactance of 10%. The line has reactance of 10% on the base of 25 MVA and 66 KV. The motor is drawing 15 MW at 0.8 pf leading and terminal voltage is 10.6KV .when symmetrical three phase fault occurs at the terminal of motor. Find the sub transient current in generator, motor and fault. **10**



Q 2 b) Derive Fortescue theorem for Symmetrical fault analysis **10**

Q 3 a) Find Critical disruptive voltage and Critical voltage for local and general corona on three phase overhead transmission line consisting of three stranded copper conductors spaced 2.5m apart at the corners of an equilateral triangle. Air temperature and pressure are 21 Degree centigrade and 73.6 cm of mercury respectively. The conductor diameter is 10.4mm. Surface factor is 0.85. Surface irregularity factors for local and general corona are 0.7 and 0.8 respectively. **10**

Q 3 b) Derive the mathematical equation of flux linkage due to radio interference in neighbourhood communication lines due to corona **10**

Q 4 a) Discuss the operation of synchronous machine on loaded condition with waveform equation and equivalent circuit diagram. **10**

Q 4 b) Derive the equation for fault current for Single Line to Ground Fault. State the various assumptions. Draw the sequence network for same **10**

Q 5 a) Why Insulation Coordination is required? Explain the following: 1. Surge Reactor 2. Surge Capacitor 3. Lightning Rod **10**

- Q 5 b) Explain construction and working of following: 1. Thyrite type Surge Arrester 2. Metal Oxide Gapless Arrester **10**
- Q 6 a) A delta connected balanced resistive load is connected across an unbalanced three phase supply. where the current in line A is 10A at angle (30 degree) and current in line B is 15A at angle (-60degree). Find the symmetrical components of line currents also find the symmetrical components of delta currents. **10**
- Q 6 b) Discuss the formation of Corona. State factors affecting the corona. **10**

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