

Duration 3hrs

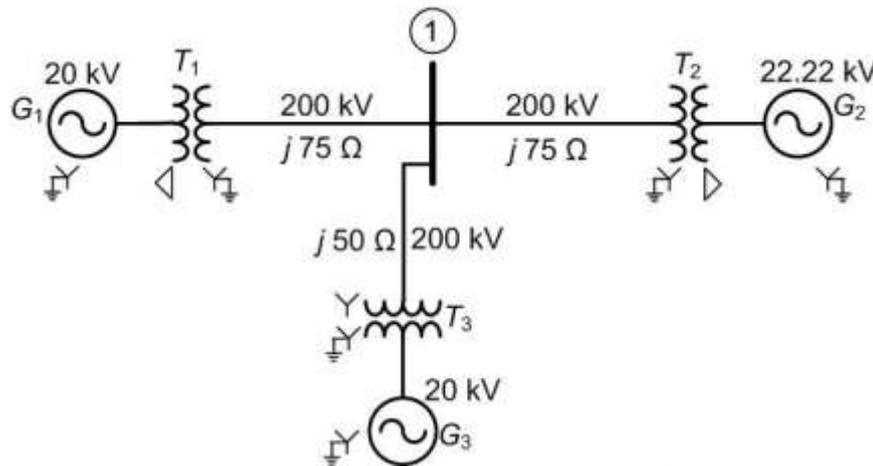
Total Marks -80

- N.B.:-** (1) Question No.1 is compulsory.  
 (2) **Attempt** any **three** questions out of remaining **five** questions.  
 (3) Draw neat diagrams wherever it is necessary.

- Q 1. Answer the following questions.
- A) Compare AC and DC Supply system **05**
  - B) What are the factors affecting sag? **05**
  - C) Derive the expression for capacitance of single phase two wire transmission line **05**
  - D) What is Ferranti effect? **05**
- Q 2 a) Draw & Explain single line diagram of structure of typical AC supply system **10**
- Q 2 b) Drive the expression of string efficiency for 4 disc insulators string **10**
- Q 3 a) In a string of three units, the capacitance between each link pin to earth is 11% of the capacitance of one unit. Calculate the voltage across each unit and the string efficiency when the voltage across the string is 33 kV. **10**
- Q 3 b) Derive expression for inductance of single phase line having Composite conductors **10**
- Q 4 a) Draw nominal  $\pi$  method of medium transmission line and derive the equation for sending end voltage and sending end current with phasor diagram **10**
- Q 4 b) A single circuit transmission line is delivering a load of 100 MVA at 220kV and p.f. of 0.85 lagging. The line as  $A=D= 0.96 \angle 3^\circ$ ,  $B=110 \angle 72^\circ$  ohm,  $C= 0.0005 \angle 90^\circ$  siemens. Calculate sending end voltage, sending end current and sending end power **10**
- Q 5 a) State advantages and disadvantages of P.U. System & how the base quantities are selected? **10**
- Q 5 b) Consider the 50 Hz power system the single-line diagram of which is shown in Fig. 1. The system contains three generators, three transformers and three transmission lines. The system ratings are
- Generator  $G_1$ : 200 MVA, 20 kV,  $X_d = 15\%$
  - Generator  $G_2$ : 300 MVA, 18 kV,  $X_d = 20\%$
  - Generator  $G_3$ : 300 MVA, 20 kV,  $X_d = 20\%$

- Transformer  $T_1$ : 300 MVA, 220Y/22 kV,  $X = 10\%$
- Transformer  $T_2$ : Three single-phase units each rated 100 MVA, 130Y/25 kV,  $X = 10\%$
- Transformer  $T_3$ : 300 MVA, 220/22 kV,  $X = 10\%$

The transmission line reactances are as indicated in the figure. Draw the reactance diagram choosing the Generator 3 circuit as the base.



- Q 6 a) Explain grading of cable and describe any one in detail. 10
- Q6 b) Write a note on 10
- i) Measurement earth resistance & soil resistivity
  - ii) Tower footing resistance

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