

Total No. of Questions : 12]

SEAT No. :

P2320

[4758] - 55

[Total No. of Pages :4

T.E.

ELECTRICAL

Power System - II

(2008 Course) (Semester - II)

Time :3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) Solve any three questions from each section.*
- 2) Answers to the two sections should be written in separate answer -books.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*
- 5) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam table is allowed.*
- 6) Assume suitable data, if necessary.*

SECTION - I

- Q1)** a) Derive the power flow equations for real and reactive power at receiving end. **[8]**
- b) A three phase 132kV overhead line delivers 50MVA at 132kV and power factor 0.8 lagging at its receiving end. The constants of line are $A = 0.98$, $\alpha = 3^\circ$ and $B = 110$, $\beta = 75^\circ$ ohm per phase. **[8]**

Find

- i) Sending end voltage and power angle
- ii) Sending end active and reactive power
- iii) Line losses and vars absorbed by the line

Capacity of static compensation equipment at the receiving end if the sending end voltage to 140kV for the same load condition.

OR

P.T.O.

Q2) a) Explain procedure to draw receiving end circle diagram. What information can be obtained from power circle diagram? [8]

b) What is surge impedance loading? Explain different methods used to improve surge impedance loading. [8]

Q3) a) Explain the advantages and drawbacks of EHVAC transmission. [8]

b) Explain the phenomenon of corona and state various methods to reduce it. [8]

OR

Q4) a) Find the disruptive critical voltage and visual critical voltage for local and general corona for a three phase line consisting of 21mm diameter conductors spaced in 6m delta configuration. Take temperature 25°C, pressure 73cm of mercury, surface factor 0.84, irregularity factor for local visual corona 0.72 and for general (decided) visual corona 0.82.[8]

b) What is corona loss? Why it is different in different weather conditions? How can it be estimated? [8]

Q5) a) Explain in detail the sub transient, transient and steady states at the 3 phase S.C. fault condition on an unloaded alternator, and explain how you will find sub transient, transient and steady state currents? [8]

b) A 50 MVA generator with 10% reactance and 100MVA generator with 8% reactance (on their own base) are connected as shown in fig 1. The fault level on bus 1 is to be restricted to 1000MVA. Calculate on 100MVA base [10]

i) Reactance of bus bar reactor X

ii) Fault level of bus 2

MVA ratings of circuit breaker C.

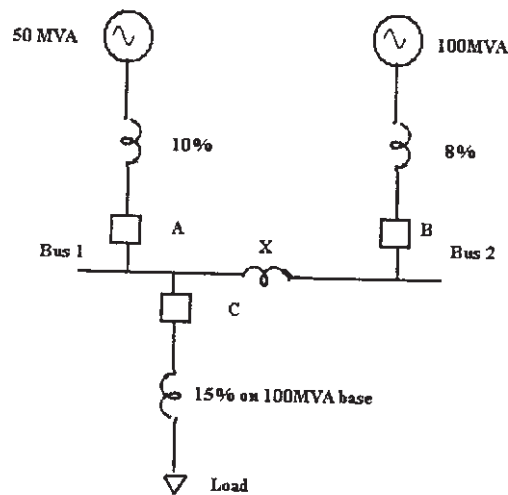


Figure 1

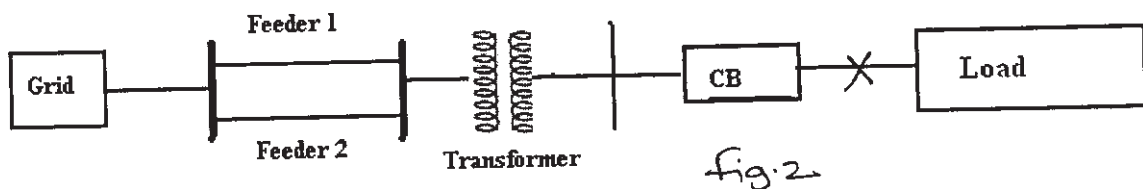
OR

- Q6)** a) What do you mean by DC offset current? What is the effect of instant of short circuit on the waveform of short circuit current of R-L circuit. [10]
- b) Determine the required MVA rating of the circuit breaker CB for the system shown in fig..2. Consider the grid as infinite bus. Choose 6MVA as base. [8]

Transformer - 3 phase, 33/11kV, 6 MVA, impedance $0.01 + j 0.07$ pu

Load - 3 phase, 11kV, 5000kVA, 0.85 lagging, impedance $j 0.2$ pu

Impedance of each feeder is $9.5 + j 7 \Omega/\text{ph}$.



SECTION- II

- Q7)** a) Explain the use of symmetrical components in the fault analysis. What do you mean by operator 'a'? Give its significance in fault analysis. [10]
- b) Derive the expression for fault current in case of SLG fault considering the sequence network under this type of fault with suitable diagram. [8]

OR

- Q8)** a) A 30 MVA, 11kV, Y connected synchronous generator is at no load and rated voltage. If $X_1 = X_2 = 14\%$, $X_0 = 7\%$. Estimate [8]
- i) Resistance X_n to limit SLG fault current, if the ratio of SLG fault current to three phase short circuit current is 1.
- ii) LLG fault current with X_n in neutral grounding circuit.
- b) Derive the expressions of positive, negative and zero sequence reactances of transmission line. [10]

- Q9)** a) Explain Gauss-Seidal method of load flow analysis. [8]
- b) Derive the static load flow equations. [8]

OR

- Q10)** a) Explain the types of buses in detail. [8]
- b) Explain formulation of Y bus matrix using direct method. [8]

- Q11)** a) Give the advantages and limitations of HVDC transmission. [8]
- b) Explain the constant extinction angle control method in detail. [8]

OR

- Q12)** a) Compare the HVDC with EHVAC transmission. [6]
- b) What are the various components of HVDC sub-station system? Draw the simple block diagram for the same. [10]

