Total No. of Questions :10]

SEAT No. :

P1714

[Total No. of Pages :3

[5058] - 347

T.E. (Electrical)

POWER SYSTEM - II

(2012 Course) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Find the following for a single circuit transmission line delivering 50MVA at 110kV and p.f. 0.8 lagging:

i) Sending end voltage

ii) Sending end current

iii) Sending end power

iv) Efficiency of transmission line. Given that $A = D = 0.98 \angle 3°$; $B = 110 \angle 75°$ ohm; $C = 0.0005 \angle 80°$ siemens. **[6]**

b) Compare bipolar and mono polar HVDC system. **[4]**

OR

Q2) a) Draw and describe Monopolar and Bipolar HVDC transmission system with merits and demerits. **[6]**

b) In EHV AC transmission line, show that the power losses in the transmission line is inversely proportional to square of operating voltage. **[4]**

Q3) a) Derive power flow equation for receiving end side of transmission line. **[6]**

b) Explain phenomena of corona in EHVAC power transmission. **[4]**

OR

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Q4) a) Derive the formula for critical disruptive voltage in corona. **[6]**

b) Write short note on "HVDC lines in India". **[4]**

Q5) a) Derive power flow equation for 'n' bus system. **[8]**

b) Three motors are connected to a common bus. Each motor is rated 5000 HP, 3.3kV, 0.8 p.f. with 17% reactance. They are supplied by a generator 20MVA, 11kV with reactance 10% through 11/3.3kV, 18MVA transformer and having 5% leakage reactance. Draw the per unit reactance diagram. Take $1kVA = 1.1 \times HP$. Take 20MVA and 11kV base on generator. **[9]**

OR

Q6) a) Distinguish clearly between per unit method and percentage reactance method. Show that per unit reactance referred to the circuits connected by transformer is same if base kVA is taken for both circuits and the base kVs ratio equal to transformer ratio. **[8]**

b) Derive Y_{BUS} matrix using singular transformation method for 'n' bus system. **[9]**

Q7) a) Draw sub-transient, transient and steady state reactance diagram of alternator and show that $x_d'' < x_d' < x_d$ of an alternator. **[8]**

b) A three phase 11kV, 10MVA, generator has a direct axis steady state reactance of 10%. It is connected to a 5MVA transformer having 5% leakage reactance and ratio of 11/33kV. The 33kV side is connected to a transmission line having $1 + j4$ ohm impedance. A three phase fault occurs at other end of transmission line. Calculate steady state fault MVA and current assuming no load prior to the fault when fault is at **[9]**

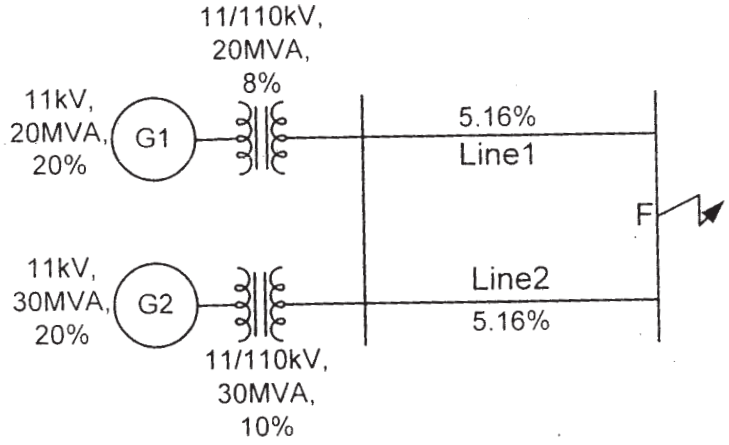
i) Sending end of line.

ii) Receiving end of line. Take base of 11kV, 10MVA on generator.

OR

Q8) a) Draw and explain oscillograph diagram of three phase fault current if the fault is taken place on an unloaded generator terminals. Clearly indicates the duration of each period. **[8]**

b) For the following system if the three phase fault is occurred at point F. Determine fault current supplied by each generator. All impedances are given on their individual rating. Take base of 11kV, 30MVA on generator side. **[9]**



Q9) a) If x_1 and x_2 are positive and nagative sequence reactance respectively, show that **[10]**

$$\frac{L-L\ Fault\ current}{L-L-L\ Fault\ Current}=1.732\left(\frac{x_1}{x_1+x_2}\right)$$

b) The zero and positive sequence component of R-phase are as under V_{RO} = 0.5 – 0.866 p.u. and $V_{R1} = 2 \angle 0°$ p.u. If the phase voltage of R - phase is $V_R = 3 \angle 0°$, find the nagative sequence component of R-phase and phase voltages V_Y and V_B assuming phase sequence as RYB. **[6]**

OR

Q10)a) A three phase 11kV, 10MVA alternator has sequence reactance as follow x_0 = 0.05 pu, x_1 = 0.15 pu, x_2 = 0.15 pu. If the generator is on no load, find the ratio of fault currents for LG fault to that when all the 3- phases are dead short circuited. **[6]**

b) Derive formula for fault current in case of LLG fault. **[10]**