Total No. of Questions : 10]

SEAT No. :

P1735

[Total No. of Pages : 4

[5460] - 565
T.E. (Electrical)
POWER SYSTEM - II
(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Prove that complex power $S = \bar{V} \times \bar{I}^*$. **[5]**

b) What are the factors affecting corona? Elaborate the methods to reduce corona loss. **[5]**

OR

Q2) State true or false with justification :

a) If 50% line capacitive series line compensation is connected in a transmission line, power transfer capability is reduced by 50% than uncompensated line. **[2.5]**

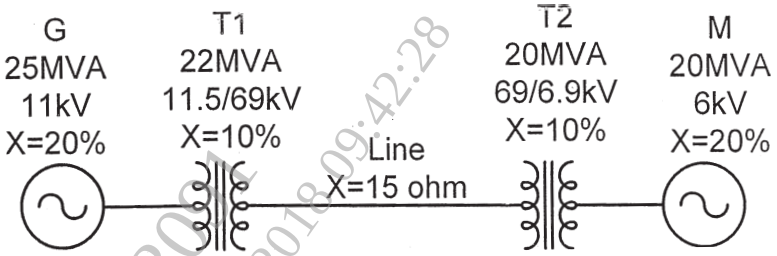
b) When HV transmission line is unloaded, the voltage regulation is negative. **[2.5]**

c) Increase in the spacing between the conductor, increases the corona loss in EHV AC transmission line. **[2.5]**

d) The per unit impedance on HV side of transformer is less than LV side of transformer. **[2.5]**

P.T.O.

Q3) a) Take base MVA = 25 MVA and base kV = 69kV on transmission network and draw per unit diagram to these base values. **[7]**



b) What are the advantages of EHV AC transmission system? **[3]**

OR

Q4) a) Derive the active and reactive power equation for receiving end using generalized transmission line constant. **[7]**

b) Give the classification of buses with known and unknown variables in load flow analysis. **[3]**

Q5) a) A three phase 11kV, 5MVA, generator has a direct axis steady state reactance of 20%. It is connected to a 3MVA transformer having 5% leakage reactance and ratio of 11/33kV. The 33kV side is connected to a transmission line having 30 ohm reactance. A three phase fault occurs at other end of transmission line. Calculate steady state fault MVA and current supplied by generator assuming no load prior to the fault. Take base of 11 kV, 5 MVA on generator. **[9]**

b) What are the different types of current limiting reactor? With circuit diagram, elaborate operation of each type. **[8]**

OR

Q6) a) The generating station at Koyna power plant is rated at 11 kV with short circuit capacity of 1000 MVA. The generating station at Radhanagar is also rated at 11 kV with short circuit capacity of 670 MVA. If these two generating stations are connected with interconnector of reactance $j0.4\Omega$, calculate possible short circuit MVA at each station. Take 1000 MVA as base (Hint : Short circuit MVA = Base MVA /reactance in pu, Take base MVA = 1000 MVA and base kV = 11kV) **[9]**

b) In case of three phase fault at the terminal of an unloaded alternator, prove that $x''_d < x'_d < x_d$ and $I''_f > I'_f > I_f$ with mathematical relation and diagram. (where I_f is fault current) **[8]**

Q7) a) A 50 MVA, 11 kV, three phase synchronous generator was subjected to different types of faults without fault impedance. The generator neutral is solidly grounded. Find the per unit values of three phase sequence reactance of the generator if the fault currents are as follows : **[9]**

LG fault = 4200 A, LL fault = 2600 A, LLL fault = 2000 A.

b) Prove that apparent power in three phase circuit is given by **[8]**

$$S_{abc} = 3V_{a0}I_{a0}^{*} + 3V_{a1}I_{a1}^{*} + 3V_{a2}I_{a2}^{*}$$

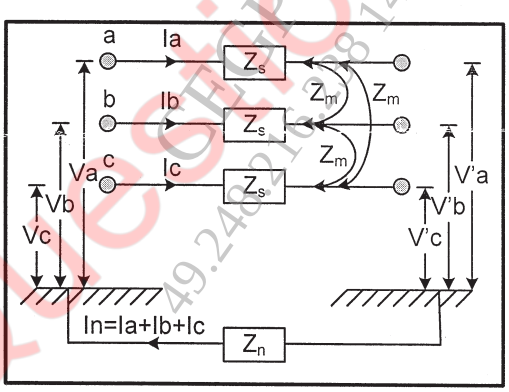
OR

Q8) a) Three 6.6 *kV*, 10 MVA, 3 - phase synchronous generators are connected to a common bus bar. Each machine has $x_1 = 20\%$, $x_2 = 15\%$, $x_0 = 6\%$. If LG fault is occurred on the common bus bar, determine the fault current when **[9]**

i) If all generator neutrals are solidly grounded.

ii) If one of the generator neutral is solidly grounded and others are isolated.

b) An unsymmetrical loaded transmission line is given in following figure. Show that $Z_0 = Z_s + 2Z_m + 3Z_n$ and $Z_1 = Z_2 = Z_s - Z_m$. **[8]**



Q9) a) Compare HVDC and EHVAC transmission system based on following points with due justification. **[8]**

i) Stability

ii) Power transfer capability

iii) Right of way

iv) Short circuit fault level

b) Explain constant current control in HVDC transmission system with characteristic and DC current equation. **[8]**

OR

Q10) a) What are different types of HVDC link? With neat diagram, elaborate each type in details. **[8]**

b) Draw the complete single line diagram of HVDC system showing all components and elaborate any three components in detail. **[8]**

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