Scheme - I

Sample Question Paper

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

22529

Semester : **Fifth**

Course Title : **Power System Analysis (Elective)**

Max. Marks : **70** **Time: 3 Hrs.**

Instructions:

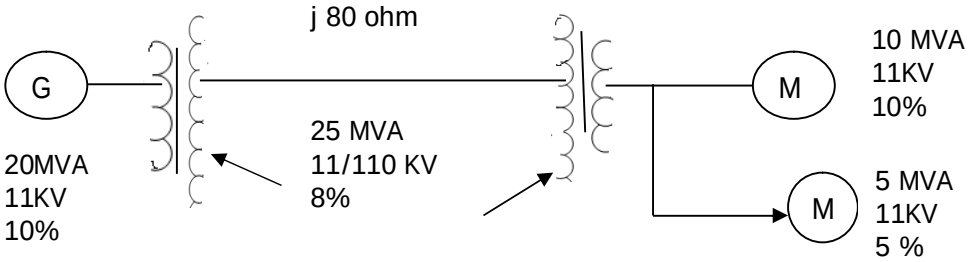
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1) Attempt any Five of the following. **10 Marks**

a) List out the role of power system engineer for analysing of power system.
b) Draw the Equivalent circuit of T network.
c) State the impact of Resistance & Inductance in transmission line performance.
d) List out four factors affecting Skin effect.
e) State the formula for generalized circuit constants for the π model.
f) Determine Generalized Circuit constant A if Z = (20+ j 52) ohm/ph& Y = $315x10^{-6}$S/ph.
g) Recall X & Y coordinates for center of Sending end Circle diagram

Q.2) Attempt any Three of the following. **12 Marks**

a) Develop a reactance diagram for following structure considering generator rating as base value.



b) Calculate self GMD for following arrangements of conductors each having radius 'r' asshown in the figures.

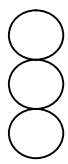


Fig (i)

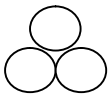


Fig (ii)

c) Determine the GCC for the resultant network, of two networks connected in series.

d) A 220 kV transmission line has following generalized circuit constants $A=0.75\angle 5^o$, $B=110\angle 85^o$. Determine the power at unity power factor that can be delivered if the voltage at each end is maintained at 220 kV.

Q.3) Attempt any Three of the following. 12 Marks

a) Summarize the advantages of Per unit system

b) Explain skin effect &proximity Effect

c) Explain the concept of Generalized Circuit Constant.

d) A three phase line has parameters $A=D=0.9\angle 0.4, B=99\angle 77$. Sending end voltage and receiving end voltage are maintained at 220 kV. Determine Maximum power supplied at sending end.

Q.4) Attempt any Three of the following. 12 Marks

a) Give the equation for complex power, active & reactive powerat receiving end.

b) A 3 phase 3 wire systems has its conductors arranged at corners of equilateral triangle of side 6m. The diameter of conductor is 2 cm. Evaluate the Inductance in mH/Km of each conductor.

c) For Linear bilateral Passive network , show that $V_R=AV_S - B I_S$ and $I_R= - C V_S+ D I_S$

d) Derive the condition for maximum power transferred at receiving end.

e) State the benefits of generalised circuit representation.

Q.5) Attempt any Two of the following. 12 Marks

a) Calculate the total capacitance in µF/Km/phof each conductor of 3.3 KV, 3 phase, 50 Hz,30 km long transmissionline havingdiameter of each conductor 20 mm& spacing between conductor 3m, 5m & 4m ..Find the charging current/ph.

b) Calculate receiving end maximum power transferred by circle diagram for 3 phase line operating at 120KV and 100 KV on sending end & receiving end respectively. $A= 0.96\angle 3^0$ and $B = 40\angle 75^0$ ohm/ph.

c) Describe the necessity of reactive power compensation. List out reactive power compensation devices. Suggest suitable device for following application

i) Substation

ii) Long transmission line

iii) Load center

Q.6) Attempt any Two of the following. 12 Marks

a) Determine complex power at sending end for 3 phase transmission line delivering load 50MVA, 132 kV , 0.8 lag pf . Transmission line constants are $A = 0.98\angle 3^0$ and $B = 110\angle 75^0$ ohm/ph. Load angle delta is 11^0

b) Write step by step procedure for drawing Sending End Circle diagram.

c) A three phase 50 Hz transmission line having impedance (10 + j 32)ohm/ph. & admittance 2.8×10^{-4}S/phdelivers load of 35MW, 132 kV , 0.8 lag pf . Use π method & calculate Constant A&B. Calculate the voltage regulation.

Scheme - I

Sample Test Paper - I

Program Name : **Electrical Engineering Program Group**

Program Code : **EE/EP/EU**

22529

Semester : **Fifth**

Course Title : **Power System Analysis (Elective)**

Max. Marks : **20** **Time: 1 Hour**

Instructions:

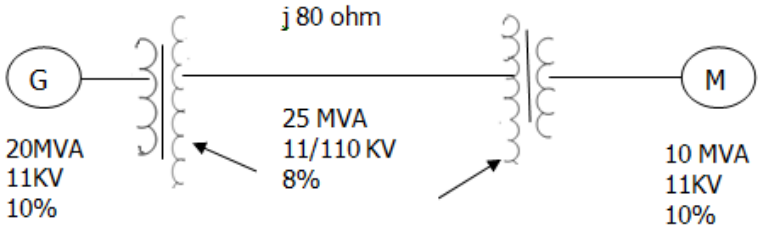
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

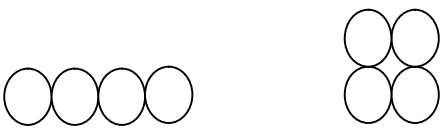
a. Draw equivalent circuit for Alternator
b. Define per unit value.
c. Define impedance diagram & reactance diagram.
d. Compare R_{ac} with R_{dc}.
e. State the necessity of transposition.
f. State the factors affecting proximity effect

Q.2 Attempt any THREE. **12 Marks**

a) Develop a reactance diagram for following structure considering Transformer rating as base value.



b) Derive the expression for inductance of 3-phase line composed of solid conductors with asymmetrical spacing.
c) Explain the method to consider the effect of the earth field on the capacitive parameter of the transmission line.
d) Define self GMD & calculate it for following arrangement of conductors each having radius 'r' as shown in figures.



e) Calculate the capacitance of each conductor of 1 phase, 30 km long transmission line the diameter of each conductor is 20 mm& spacing between conductors is 3m.

Scheme - I

Sample Test Paper - II

Program Name : Electrical Engineering Program Group
Program Code : EE/EP/EU
Semester : Fifth
Course Title : Power System Analysis (Elective)
Max. Marks : 20 **Time: 1 Hour**

22529

Instructions:
(1) All questions are compulsory.
(2) Illustrate your answers with neat sketches wherever necessary.
(3) Figures to the right indicate full marks.
(4) Sub-questions in a main question carry equal marks.
(5) Assume suitable data if necessary.
(6) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR. **08 Marks**

a) Define Generalized Circuit Constants

b) Calculate ABCD constants for nominal T model if three phase line has series impedance of (20 + j 60) ohm/ph& shunt admittance of 600×10^{-4} mho/ph

c) List out reactive power compensation devices.

d) State the advantages of circle diagram

e) Give the expression for Sending end complex power and define the parameters.

f) Calculate complex power if voltage = $230\angle 2^{o}$ & current = $5\angle 30^{o}$.

Q.2 Attempt any THREE. **12 Marks**

a) Derive the expressions for Receiving end complex power, Active power & reactive power.

b) Calculate coordinate of center & radius for receiving end circle diagram for 3 phase line operating at 110 KV and 100 KV on sending end & receiving end respectively. A = $0.9\angle 10^{o}$ and B = $100\angle 85^{o}$ ohm/ph

c) Derive the condition for maximum power transferred at receiving end.

d) A 220 kV transmission line has following generalized circuit constants $A=0.75\angle 5^{o}$, $B=110\angle 85^{o}$. Determine maximum power that can be delivered if the voltage at each end is maintained at 220 kV.