22529

22232

3 Hours / 70 Marks

Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE : **10**

(a) State any two roles of a Power System Engineer.

(b) Draw Pi-equivalent circuit (π) of a medium transmission line. Show various quantities on it.

(c) Define (i) Self GMD (ii) Mutual GMD.

(d) Explain effect of inductance in transmission line performance in AC line.

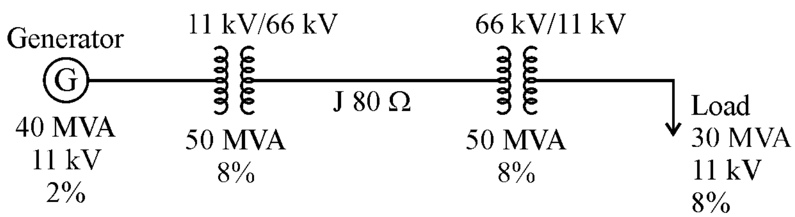
(e) State formulae for Generalized Circuit constant for T Equivalent Network.

(f) Write any two advantages of Generalized Circuit Representation.

(g) Write any two advantages of graphical analysis for line performance.

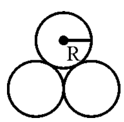
2. Attempt any THREE : 12

(a) Derive the reactance diagram in per unit system for the power system shown below : Consider Generator values as Base values.



(b) Calculate self GMD for following arrangements of conductors. Assume radius of each conductors as R.

(i) 

(ii) 

(c) Determine the Generalized Circuit Constant for the resultant when two GCC are connected in parallel.

(d) A 132 KW transmission line has Generalized Circuit Constants as A = 0.76 ∠5°, B = 105 ∠86°. Calculate power at unity power factor that can be transmitted if voltage at each end is maintained 132 KV.

3. Attempt any THREE : 12

(a) Explain any four advantages of per unit representation of power system parameters.

(b) (i) Explain how capacitances are formed in a transmission line.

(ii) Explain why shunt capacitances are neglected in ⊥ short transmission line.

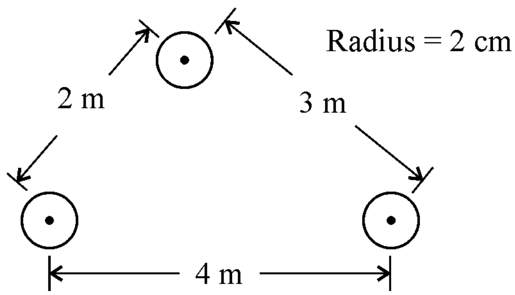
(c) Explain how A, B, C, D constants are defined from its basic equations. Write its units.

(d) Prove that in power system, complex power Equation is S = V I*.

4. Attempt any THREE : **12**

(a) Write complete procedure for drawing Sending End Circle Diagram.

(b) Calculate Inductance per km for a transmission line whose conductors are arranged as shown in following figure.



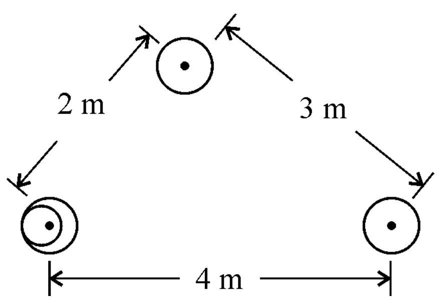
(c) Explain the concept of generalized circuit applicable to transmission line.

(d) Write the expression for complex power at receiving end. Derive the condition for transferring maximum power at receiving end.

(e) Prove that using Generalized Circuit constants for short transmission line A D – B C = 1

5. Attempt any TWO : **12**

(a) Calculate the capacitance per km per phase of each conductor of 66 KV, 3 phase line with arrangement of conductor as below. Assume diameter of each conductor as 3 cm.



(b) Write complete procedure for drawing receiving end circle diagram.

(c) A three phase, 132 KV. transmission line delivers 100 MVA at 132 KV at a power factor of 0.8 lag at its receiving end. The constants are A = 0.98 $\angle 3$ & B = 110 $\angle 70°$ ohm per phase.

Find : (i) Sending End voltage and Power Angle.

(ii) Sending End Active Power and Reactive Power.

6. Attempt any TWO : **12**

(a) Determine active power, Reactive power at sending end for a load of 100 MVA, 220 KV, 0.9 pf lag.

Line constants are $A = 0.93 \angle 3°$ and $B = 105 \angle 75°$ ohm/phase. Consider load angle as 10°.

(b) Explain necessity of Reactive Power compensation. Explain working of any four equipments that are used in Reactive Power Compensation.

(c) A 132 KV, 50 Hz, three phase Transmission line delivers a load of 50 MW at 0.8 pf lag at the receiving end. The Generalized Constants of the transmission line are

$A = 0.84 \angle 6°$, $B = 100 \angle 80°$, $C = 0.0018 \angle 94°$.

Find Sending End Voltage, Sending End Current and % Voltage Regulation. Use Nominal Pi method.
