22529

11920

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.

Marks

1. Attempt any FIVE of the following : **10**

(a) Draw equivalent circuit of alternator.

(b) Define impedance diagram and reactance diagram.

(c) List out factors affecting proximity effect.

(d) State the impact of inductance and resistance on transmission line performance.

(e) Give the expression for ABCD constant of T model.

(f) Determine ABCD constant of short transmission line having impedance $(20 + j50)\Omega$.

(g) Recall X & Y coordianes for centre of sending and circle diagram.

2. Attempt any THREE of the following : **12**

(a) Develop a reactance diagram for structure of power system (Refer Fig. 1) considering generator as base.

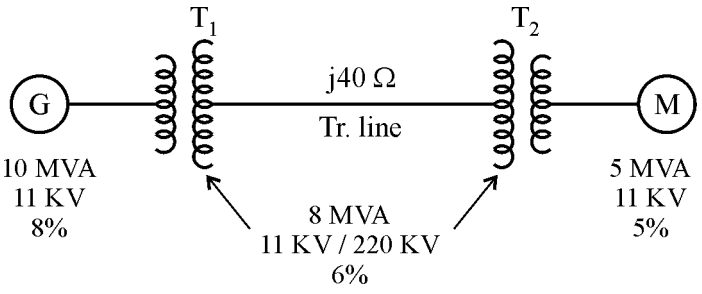


Fig. 2 (a)

(b) Define self GMD & Mutual GMD with the help of example.

(c) 3ϕ transmission line with impedance 32.9 ∠ 72.35 Ω/ph and admittance $j2.827 \times 10^{-4} \angle 90$ Ω/ph delivers load of 35 MW, 132 KV, 0.8 P.F. lag. Use π method and determine ABCD constants.

(d) Derive the expression for complex power, active and reactive power at sending end.

3. Attempt any THREE of the following : **12**

(a) Summerise the role of power system engineer.

(b) Derive the expression for inductance of 3ϕ line with symmetrical arrangement.

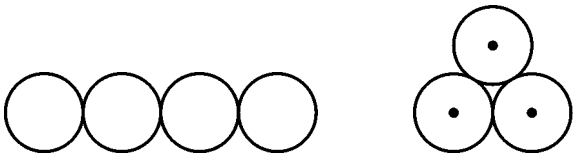
(c) Define Generalised circuit constants.

(d) A 200 kV line with GCC A = 0.86 ∠ 7°, B = 300 ∠ 75° Ω. Determine real power at unity P.F. that can be received if voltage at both end is maintained at 200 kV.

4. Attempt any THREE of the following : **12**

(a) Give the stepwise procedure for drawing circle diagram at receiving end.

(b) Calculate self GMD for conductors (Refer Fig. 2).



(i) (ii)

Fig. 4 (b)

(c) A 3ϕ 50 Hz line has resistance of 20 Ω, inductance 0.2 H and capacitance 1 μF. Determine ABCD constants of line considering π model.

(d) Derive the condition for maximum power at sending end.

(e) 3ϕ line with GCC A = 0.99∠0.08°, B = 10 + j31.42, C = 2.79×10^{-4} ∠90.04° supplies load of 35 MW, 132 kV, 0.8 lag. Determine regulation of line.

5. Attempt any TWO of the following : **12**

(a) Determine Inductance & Capacitance of 3ϕ line operating at 50 Hz and conductors are arranged at corners of symmetrial triangle with side 3.4 m & diameter of each conductor is 0.8 cm.

(b) A 3ph 132 kV transmission line delivers 40 MVA at 0.8 pf lag. Draw receiving end circle diagram and determine sending end voltage for A = 0.98 ∠ 3°, B = 140 ∠78°.

(c) A 3ϕ line has following parameters A = D = 0.9 ∠ 0.4°, B = 99 ∠ 76.86° load angle is 9°. If sending end and reciving end voltages are maintained at 220 kV, calculate sending end complex power, active power and reactive power.

6. Attempt any TWO of the following : **12**

(a) 3ϕ line has parameter A = D = 0.9 ∠ 0.4°, B = 99 ∠ 76.86°, sending end & receiving end voltages are maintained at 220 kV. Calculate maximum power supplied at sending end.

(b) State the necessity of reactive power compensation equipment. List out the devices used for reactive power compensation and give application of each device.

(c) Prove that AD – BC = 1.

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