17510

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3 Hours / 100 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. A) Attempt **any three** of the following : **12**

a) Draw a basic structure of power system showing different voltage levels.

b) Give the expression for complex power, active power and reactive power at receiving end.

c) State the significance of resistance parameter on performance of transmission line.

d) List the advantages of generalised circuit representation.

B) Attempt **any one** of the following : **6**

a) Explain the procedure for measurement of generalised circuit constants.

b) Define skin effect and proximity effect. State factors on which skin effect and proximity effect depends.

2. Attempt **any two** of the following : **16**

a) i) Define generalised circuit and generalised circuit constant.

ii) Explain the procedure for receiving end circle diagram with usual notation.

Marks

b) Determine inductive reactance of 1 φ tr. line arrangement shown in fig. 1 per mt. length. The dia.of each conductor is 1cm and current is equally shared by two parallel conductors.

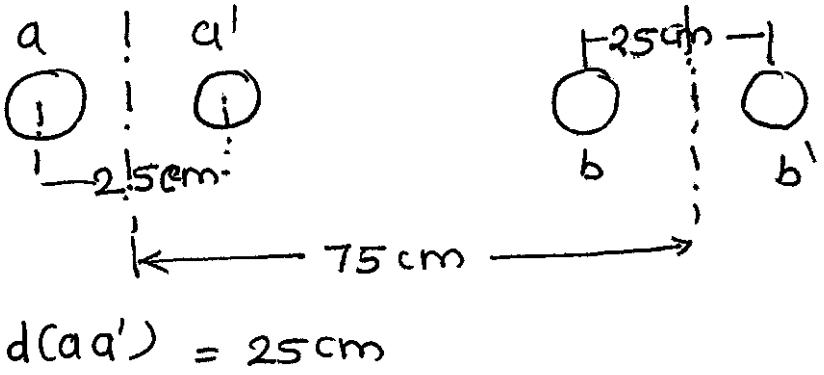

Fig. 1

c) If A and B constants of a 3 φ tr. line are $0.9\angle 1^\circ$ and $100\angle 85^\circ$ respectively. Determine the receiving end current and power supplied to load. Assume both sending end and receiving end voltages are 200 kV with phase dift. of 8° between them.

3. Attempt **any four** of the following : **16**

a) Draw the reactance diagram of given power system as shown in fig. 2 select generator rating as the common base value.

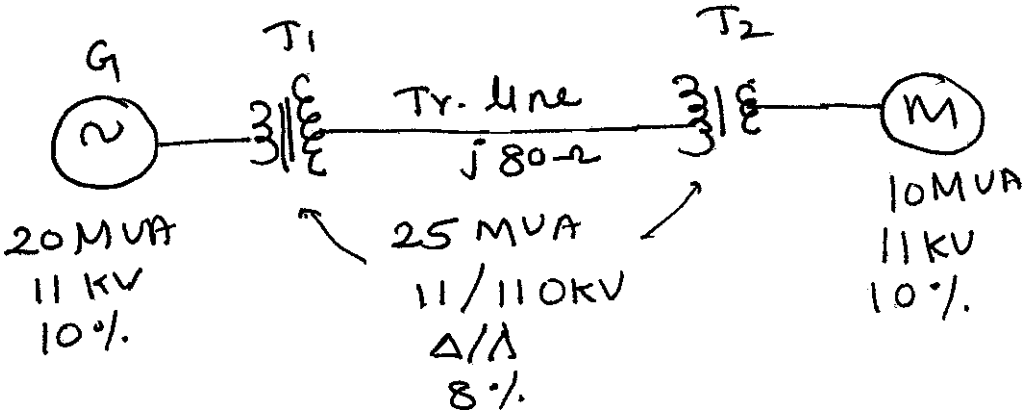

Fig. 2

b) Give the expression for coordinates for centre and radius for sending end and receiving end circle dia.

Marks

c) Determine the inductance of 3 φ line operating at 50 Hz and conductors are arranged at triangle of sides 1.6 m, 3.2 m and 1.6 m. The conductor diameter is 0.8 cm.

d) A 250 kV transmission line has following GCC-A = 0.85 ∠7°, B = 300 ∠75° Ω /phase. Determine power at unity P.F. that can be received if voltage at each end is maintained at 250 kV.

e) Derive an expression for capacitance of 1 φ tr. line compose of solid conductor.

4. A) Attempt **any three** of the following : **12**

a) Define self GMD and mutual GMD.

b) A 275kV 3 φ line has following parameter A = 0.91 ∠1.5°, B = 115 ∠77°. If the receiving end voltage is 275 kV determine the max. power that can be delivered if sending end V is held at 295 kV.

c) Explain the role of power system engineer.

d) State the need of reactive power compensation and name the devices used for reactive power compensation.

B) Attempt **any one** of the following : **6**

a) A 50Hz 3 φ tr. line is 250 km long. It has a total series impedance of 35 + j40 Ω and shunt admittance of 930×10^{-4} ℧. It delivers 40,000 kW at 220 kV with 90% p.f. lag. Find ABCD constant considering medium line having nominal T circuit regulation of line.

b) Find self GMD for arrangement as shown in fig. 3 If r = 0.1cm.

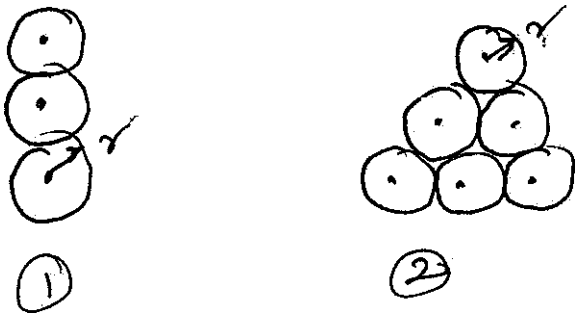

Fig. 3

Marks

5. Attempt **any two** of the following : **16**

a) Derive overall ABCD constants of series connected two transmission line networks.

b) A 3 φ line has following constants. A = D = 0.9 $\angle$ 0.5°, B = 99 $\angle$ 78° Ω . The sending end and receiving end voltages are maintained at 220 kV. Calculate load angle when power fed at sending end is 400 MW using sending end circle diagram. Also determine maximum power delivered at receiving end.

c) A 3 φ line with equilateral spacing 3mt is to be rebuilt with horizontal spacing as $D_{13} = 2D_{12} = 2D_{23}$. The conductors are to be fully transposed. Find the spacing between adjacent conduct as such that new line has the same inductance as original value.

6. Attempt **any four** of the following : **16**

a) Prove that complex power in power system is $S = VI^*$.

b) List the advantages of PU system.

c) What is transposition of 3 φ line ? State its advantages.

d) Derive the expression for complex power at receiving end in simple two bus power system.

e) A balanced load of 50 MVA is supplied at 132 kV, 50 Hz, 0.8 pf lag by means of tr. line. The series impedance is 180 $\angle$ 75° Ω /ph and shunt admittance is $1 \times 10^{-3} \angle 90°$ S/ph calculate ABCD constants using nominal Π method.
