17510

11920

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) 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) State the role of Power System Engineer.

(b) Justify 'AC resistance is always higher than DC resistance'.

(c) State the expression for complex power, real power and reactive power at sending end of transmission line.

(d) Write advantages of generalised circuit representation.

(B) Attempt any ONE of the following : **6**

(a) For a generalised circuit prove that AD – BC = 1.

(b) Describe skin effect and proximity effect. State the factors on which skin effect and proximity effect depends.

2. Attempt any TWO the following : **16**

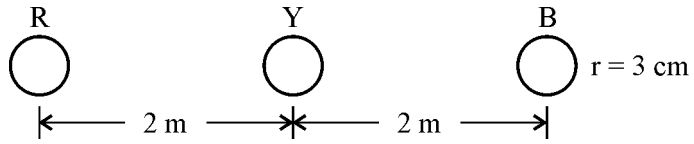
(a) (i) Write advantages of circle diagram.

(ii) Define generalised circuit constants.

(b) A 3-Ph line has following parameters :

$A = D = 0.9 \angle 0.4^{\circ}$ $B = 99 \angle 76.86^{\circ}$ load angle = 9º, sending end voltage and receiving end voltage are maintained at 220 kV. Calculate sending end active and reactive power. Also, calculate active and reactive power at receiving end.

(c) Calculate Inductance and inductive reactance / km for arrangement of 3-Ph conductors shown in fig.



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

(a) Write any four advantages of PU system.

(b) Write the steps for drawing a receiving end circle diagram with neat diagram.

(c) Explain the effect of earth field on transmission line capacitance by method mirror image.

(d) A 3-Ph 110 kV transmission line delivers 30 MVA at 0.8 p.f. lagging. Draw receiving end circle diagram and find sending end voltage. Given

$A = 0.90 \angle 2^{\circ}$ $B = 100 \angle 70^{\circ}$.

(e) Determine inductance / km of a 3-Ph line using 20 mm diameter conductor. When conductors are situated at corners of triangle with spacing 4 M, 5 M, 6 M. Conductors are regularly transposed.

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

(a) Draw single line diagram of modern Power System.

(b) Prove that in power flow equation S = VI*.

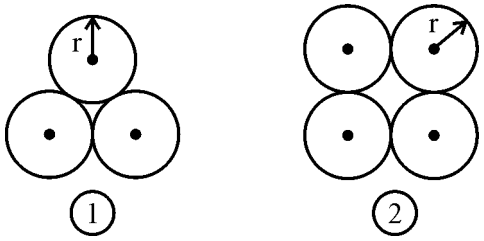
(c) Calculate the capacitance of a 100 km long 3-Ph 50 Hz overhead transmission line consisting of 3 conductors each of diameter 2 cm spaced 2.5 m at the corners of equilateral triangle.

(d) A 275 kV, 3ϕ line has the following parameters A = 0.93 $\angle 1.5^{o}$, B = 115 $\angle 77^{o}$. If receiving end voltage is 275 kV, determine the sending end voltage if load of 25 MW at 0.85 lagging P.F. is being delivered at the receiving end.

(B) Attempt any ONE of the following : **6**

(a) A 3-Ph 50 Hz 100 km line as resistance of 10 Ω, inductance 0.1 H, c = 0.9 μF delivers load of 35 MW, 132 kV, 0.8 p.f lagging using π method, calculate ABCD parameters.

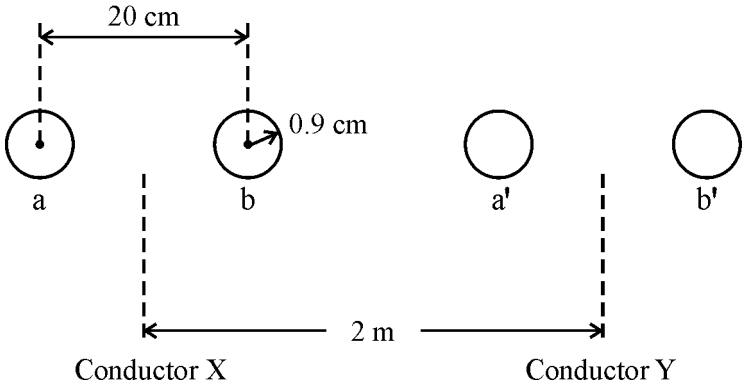
(b) Find self GMD for arrangement shown in fig., if r = 0.1 cm.



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

(a) Two transmission line network are connected in series. Determine A, B, C, D constant of overall n/w.

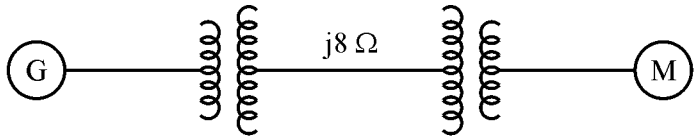
(b) Calculate inductance & inductive reactance of 1-Ph transmission line shown in fig.



(c) A 3ϕ 132 kV. tr. line delivers 40 MVA at 0.8 P.F. lagging. Determine sending end voltage with the help of circle diagram. Given A = 0.98 $\angle 3^{o}$, B = 110 $\angle 72^{o}$. Also, find max power delivered at receiving end.

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

(a) Draw reactance diagram for following power system assuming generator as base :



50 MVA	40 MVA	40 MVA	15 MVA
11 kV	11 kV / 110 kV	110 kV / 11 kV	11 kV
20%	15%	15%	30%

(b) Define self GMD and Mutual GMD with example.

(c) A balanced 3-Ph load of 30 MW is supplied at 132 kV 50 Hz 0.8 P.F. lagging z = 20 tj 52Ω and $\gamma = 315 \times 10^{-6} \angle 90^{o}$ siemens /Ph. Use nominal T method. Calculate ABCD constant.

(d) State the need of reactive power compensation. Name the devices used for reactive power compensation.

(e) Give significance of inductance resistance and capacitance parameters of tr. line.