17510

21819

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 : **12**

(a) Draw neat labelled diagram showing basic structure of power system.

(b) State the expression for real and reactive power for sending end.

(c) Compare ac resistance with dc resistance.

(d) 3 ϕ transmission line has impedance (10 + j30)Ω/ph and admittance of j2.827 × 10^{-4} ℧/ph. Calculate GCC using π method.

(B) Attempt any ONE : **6**

(a) Balanced 3 ϕ load of 30 MW is supplied at 132 kV, 50 Hz, 0.8 lag p.f. Z = (20 + j52)Ω/ph and Y = 315 × 10^{-6} ℧/ph. Use nominal J method and calculate ABCD constants, sending end voltage and % regulation.

(b) Explain self GMD and mutual GMD with the help of example.

2. Attempt any TWO : **16**

(a) (i) Define generalised circuit constants.

(ii) Derive the condition for maximum power at receiving end.

(b) Determine inductance of 1ϕ transmission line for arrangement shown in fig. 1. Diameter of conductor is 1 cm.

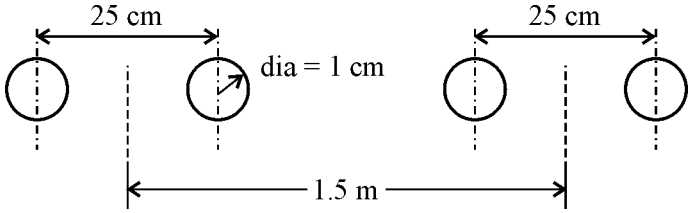

Fig. 1

(c) A 3 ϕ line has parameters A = D = 0.9 ∠0.4, B = 99∠76.86 V_S and V_R are maintained at 220 kV. Calculate maximum power supplied at sending end.

3. Attempt any FOUR : **16**

(a) Draw equivalent circuit for alternator and medium transmission line T model.

(b) State the advantages of circle diagram.

(c) Calculate self GMD for fig. 2.

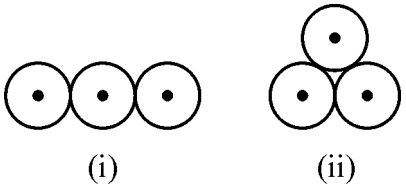

Fig. 2

(d) Explain step-by-step procedure for drawing receiving end circle diagram.

(e) Determine capacitance of 3ϕ line with conductors mounted at corners of triangle with 3 m side. Diameter of conductor is 0.8 cm

4. (A) Attempt any THREE : **12**

(a) Define transposition. State its necessity. List out advantages of transposition.

(b) A 3 pH, 132 KV, transmission line delivers 40 mVA at 0.8 pf lag. Draw circle diagram and determine sending end voltage if A = 0.98∠3, B = 110∠72.

(c) Draw reactance diagram for given power system as shown fig. 3 considering generator as base.

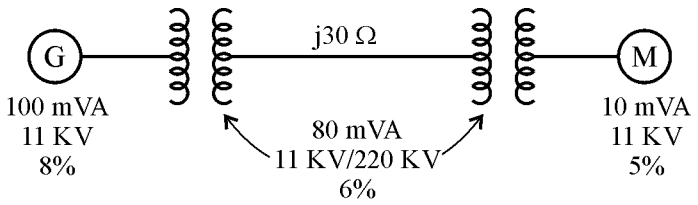

Fig. 3

(d) Give the expression for complex power at receiving end. State the equation of real power and reactive power.

(B) Attempt any ONE : **6**

(a) Prove that AD – BC = 1.

(b) Derive the equation for inductance of 3ϕ line with conductors mounted at corners of triangle with unsymmetrical spacing.

5. Attempt any TWO : **16**

(a) A 275 KV transmission line has following GCC, A = 0.85∠75, B = 300 ∠75, determine power at unity pf that can be received if voltage at each end is maintained at 275 Kv.

(b) Explain the necessity of reactive power compensation. List out the equipments used for reactive power compensation and state its field of application.

(c) A 1ϕ line with solid conductor of 10 mm dia. and spacing between conductor is 4 m. Calculate inductance and capacitance.

6. Attempt any FOUR : **16**

(a) Explain step-by-step procedure for sending end circle diagram.

(b) List out the role of power system engineer.

(c) State the significance of inductance and capacitance.

(d) 3ϕ transmission line has constants A & B as $0.9\angle i$ & $100\angle 85\Omega$/ph respectively. Calculate receiving end complex power if voltage is maintained at 200 KV at both end with load angle 8°.

(e) 3ϕ, 400 KV, 500 km transmission line has parameters as

R = 0.025 Ω/km/ph

Inductance = 1 mH/km/ph

Capacitance = 0.020 μF/km/ph

Calculate AB CD parameters for nominal T method.
