I – 154

Seat No.	

T.E. (Electrical) (Sem. – V) Examination, 2010
POWER SYSTEM ANALYSIS (New Course)

Day and Date : Monday, 29-11-2010 Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Assume ***suitable*** *data if* ***necessary*** *and state* ***clearly*** *the* ***same.***
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. A) A sub-station P supplies load of 15 MW at 0.8 p.f. lag to station Q through two overhead lines. The impedance of each line is (2+j4) Ω and (3 + j4) Ω respectively. Calculate the power transmitted by each line. **8**

   B) Draw the single line diagram of a typical power system and discuss various power system elements. **8**

2. A) A three phase, 50 H_z, 15 km long line has four conductors with 1 cm diameter and spaced horizontally 1.5 m apart in a plane. The conductors in order are carrying currents I_a, I_b and I_c and the fourth wire, which is neutral, carries zero current. The currents are :

   $I_a = -30 + j\ 50$ A

   $I_b = -25 + j\ 55$ A

   $I_c = 55 - j\ 105$ A

   The line is untransposed.

   Find the flux linkage of the neutral. Also find the voltage induced in the neutral conductor. **8**

   B) Deduce an expression for line to neutral capacitance for a 3-phase overhead transmission line when the conductors are symmetrically placed. **8**

P.T.O.

3. A) Explain various methods of improving string efficiency. **8**

   B) Explain various factors affecting corona and methods of reducing corona effect. **8**

4. Write short notes (**any three**) : **18**

   1) Skin and proximity effect

   2) Radial a.c. distribution system

   3) Types of line supports

   4) Sag in overhead lines when supports are at equal levels.

SECTION – II

5. A) Explain the terms propagation constant, velocity of propagation and characteristic impedance as related to a long transmission line. **8**

   B) A 220 KV, 50 H_z, 3-phase overhead transmission line delivers a load of 75 MW at 0.8 p.f. lagging at the receiving end and has the following constant.

   $A = D = 0.9 \angle 0.6°$, $B = 153.2 \angle 84.6°$, $C = 0.0012 \angle 90°$. Calculate sending end voltage, sending end current sending end p.f., sending end power. **8**

6. A) Explain inter-sheath grading method of cable grading. **8**

   B) Discuss different method of laying underground cables. **8**

7. A) Form the Y_{Bus} if the line series impedance are given below. **10**

Bus to Bus	**Impedance**
1 – 2	0.15 + j 0.6 p.u
1 – 3	0.1 + j 0.4 p.u.
1 – 4	0.15 + j 0.6 p.u.
2 – 3	0.05 + j 0.2 p.u.
3 – 4	0.05 + j 0.2 p.u.

   B) Compare Gauss-Seidal method and Newton Raphson method. **8**

8. A) Discuss any one method of voltage control. **8**

   B) Explain synchronous condensers and phase advancers as power factor improvement equipment. **8**