Total No of Questions: [VIII] *SEAT NO. :*

[Total No. of Pages : 2]

S.E. (Electrical)

Power Systems I

(2012 Pattern) (Semester – II)

Time: 2 Hours ***Max. Marks : 50***

Instructions to the candidates:

1) ***Attempt Q. No 1 or 2, 3 or 4, 5 or 6 and 7 or 8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to right indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume Suitable data if necessary***

Q1) a) Explain tariff setting principals in brief. Write a note on Availability Based Tariff [6]

b) A 3-phase line is supported by suspension string having three units. The voltage across the unit nearest to the line is 20 kV and that across the adjacent unit is 15 kV. Find: (i) Ratio of the shunt capacitance to self capacitance (ii) System line voltage (iii)String Efficiency [6]

OR

Q2) a) A generating station has a maximum demand of 200 MW, load factor of 75%, plant capacity factor 50% and plant use factor 75%. Find: (i) Daily energy produced (ii) Reserve capacity of plant (iii) Maximum energy that can be produced daily if plant is running all the time [6]

b) Explain in brief the necessity and working of the following, equipments used in the substation: (i) Isolators (ii) Circuit Breakers (iii) Control panels [6]

Q3) a) Derive an expression for loop inductance of a single phase two wire overhead line with conductors separated by distance ‘d’ meters and radius of each conductor as ‘r’ meters [6]

b) Explain where does maximum and minimum stress occur for HVAC and HVDC cables and why [7]

OR

Q4) a) What are the different factors affecting sag of a transmission line, Derive an expression for sag when supports are at equal level. [7]

b) Explain the necessity of transposition of conductors, how it is done. How it will affect inductance of three phase transmission line [6]

Q5) a) Derive an expression for capacitance per km to neutral of a 3-phase overhead transmission line with unsymmetrical spacing of conductors assuming transposition [7]

b) Calculate the capacitance to neutral in the case of a single phase line whose conductor radius is 0.25 cm and are separated by 1.5 m and which are lying 7m above the ground. Line length is 50 km. [5]

OR

Q6) a) Overhead line conductors of a three phase, 3 wire transmission lines are 2 cm in [6]

diameter situated at the corners of a triangle of sides 3.5 m, 5 m, 8 m. Find the capacitance/phase/km, Assume line is completely transposed

b) Derive the expression for capacitance of single phase transmission line considering effect of earth in to account. Assume radius of each conductor as 'r' meters, spacing between conductors as 'd' meters and conductors are placed at a distance of 'h' meters above ground level [6]

Q7) a) Determine the generalized circuit constants of short transmission line. State the Characteristics of it. [6]

b) A balanced 3 phase load of 80 MW is supplied at 220 kV, 50 HZ at 0.8 p.f lagging by means of a transmission line. The series impedance of a single conductor is 200 $\angle 80$ ohms and the total shunt admittance is 0.0013 $\angle 90$ mho. Using nominal 'T' method, determine : i) ABCD constants of the line ii) Sending end voltage [7]

OR

Q8) a) Explain in brief (Any two) [6]

i) Ferranti effect

ii) Effect of power factor on regulation of transmission line.

iii) Effect of power factor on efficiency of transmission line

b) A 110 kV, 50Hz, 3 phase transmission line delivers a load of 50 MVA at 0.8 p.f. lagging at the receiving end. The generalized constants of the transmission line are : A=D=0.98 $\angle 3^0$ B=110 $\angle 75^0 \Omega$ and C=0.0005 $\angle 90^0$ Siemens Find out efficiency of transmission line. [7]