Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[5252]-146

S.E. (Electrical) (Second Semester) EXAMINATION, 2017

POWER SYSTEM-I

(2012 PATTERN)

Time : Two Hours **Maximum Marks : 50**

N.B. :— (*i*) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.

(*ii*) Neat diagrams must be drawn wherever necessary.

(*iii*) Figures to the right side indicate full marks.

(*iv*) Assume suitable data if necessary.

1. (*a*) Draw and explain procedure to plot load curve. What are its types ? What information is obtained from it ? [6]

(*b*) What are the different excitation systems for alternators ? Explain any *one* in brief with a neat diagram. [6]

Or

2. (*a*) A generating station supplies the following loads 15000 kW. 12000 kW, 8500 kW, 6000 kW, and 450 kW. The maximum demand is 22000 kW. The annual load factor of the station is 48%. Calculate :

(*i*) the number of units supplied annually

(*ii*) diversity factor

(*iii*) demand factor. [6]

(*b*) With neat sketch explain function, construction, operating range and advantages of Suspension type insulator. [6]

P.T.O.

3. (*a*) Derive an expression for the inductance of a three-phase overhead transmission line when conductors are unsymmetrically spaced but transposed. [7]

(*b*) The weight of the overhead line conductor is 700 kg/km. The ultimate strength is 3000 kg. If safety factor is 2 and span length is 250 m. Find (*i*) Sag (*ii*) Height above which conductor should be supported if ground clearance required is 8 m. [6]

Or

4. (*a*) Derive an expression for maximum and minimum dielectric stress in a single core cable. [6]

(*b*) A 50 Hz overhead line consisting of 3 conductors each of diameter 1.24 cm and spaced 2 m apart. Calculate inductance per phase per km for the following arrangement between conductors :

(*i*) Equilateral spacing

(*ii*) Horizontal spacing. Assume transposed line. [7]

5. (*a*) Derive an expression for capacitance of 3 phase transmission line when conductors are symmetrically spaced in the form of equilateral triangle. [6]

(*b*) A single phase line of 250 V, 50 Hz has conductor spacing of 1.5 meters. The diameter of each conductor is 1.5 cm. conductors are located 7 m above the ground. Calculate :

(*i*) Capacitance of line for length of 50 km and

(*ii*) Charging current

Considering the following conditions :

(*i*) Without effect of earth

(*ii*) With effect of earth. [7]

Or

6. (*a*) What are method of images, with neat diagram derive the expression for single phase transmission line considering effect of earth. [6]

(*b*) Three conductors of 33 kV, 50 Hz three-phase line are arranged in horizontal plane, 6 meters apart. Cross sectional area of each conductor is 1.207 em^2, find capacitance and charging current for 100 km line in μF. [7]

7. (*a*) With neat circuit diagram and phasor diagram, derive the relationship between sending end and receiving end quantities of medium transmission line considering 'T' model of the line. [6]

(*b*) What is Ferranti effect ? Deduce a simple equation for voltage rise of a unloaded line. Draw necessary phasor diagram. [6]

Or

8. (*a*) What is the effect of load power factor on regulation and efficiency of transmission line. [6]

(*b*) 3 phase, 132 kV, 50 Hz overhead transmission line has the following distributed constants :

Resistance = 28 ohms, Inductive reactance = 63 ohms and Capacitive susceptance = $4 * 10^{-4}$ mho

If the load at receiving end is 75 MVA at 0.8 p.f. lagging, determine sending end voltage using nominal π method. [6]