Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5252]-546

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

POWER SYSTEM-I

(2015 PATTERN)

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

N.B. **:—** (*i*) Answer Q. **1** *or* Q. **2**, Q. **3** *or* Q. **4**, Q. **5** *or* Q. **6**, Q. **7** *or* Q. **8**.

(*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*) Explain in brief what is the need of equalization of potential over insulator string hence explain various methods to improve string efficiency of suspension insulators. [6]

(*b*) The tariff is Rs. 120 per kVA of maximum demand and 10 paisa per unit consumed. If the load factor is 30%, find the overall cost per unit at : [6]

(*i*) Unity p.f. and

(*ii*) 0.8 p.f.

Or

2. (*a*) Explain what are base loads and peak loads hence explain various features of base load and peak load power stations. [6]

P.T.O.

(*b*) A suspension string has 3 units each unit can withstand a max. voltage of 11 kV. The capacitance of each joint & metal work is 20% of capacitance of each disc.

Find :

(*i*) Maximum line voltage for which the string can be used.

(*ii*) String efficiency. [6]

3. (*a*) Derive an expression for internal and external flux linkages of conductor. [7]

(*b*) Derive an expression for insulation resistance of single core cable hence determine insulation resistance of single core cable of length 3 km long having conductor diameter 25 mm, insulation thickness 10 mm and specific resistance of insulation of $5 * 10^{12}$ Ωm. [6]

Or

4. (*a*) An overhead transmission line conductor having a cross-sectional area of 2.5 cm^2. Calculate the vertical sag lor a span of 300 meters where the other parameters are given below :

Weight of the conductor = 2 kg/m

Ultimate strength = 8000 kg/cm^2

Wind pressure = 37 kg/cm^2 of projected area

Safety factor = 3 [7]

(*b*) Explain in brief what is meant by G.M.R. of conductor hence prove that for overhead transmission line conductor, G.M.R. equals to 0.7788 times radius of conductor. [6]

5. (*a*) A split phase 132 kV, 50 Hz single phase transmission line is shown in Fig. (1) conductor 1 & 2 in parallel form one path while conductors 1' & 2' in parallel form return path. The current is equally shared by the two parallel conductors. Determine the capacitance and charging current to neutral per km of the line. The radius of each conductor is 1.2 cm. [7]

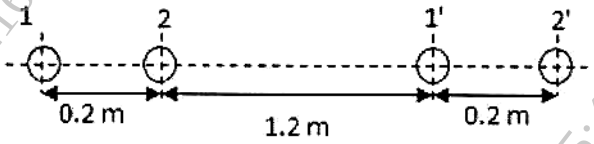

Fig. 1

(*b*) Derive an expression for capacitance of three phase transmission line when conductors are unsymmetrically spaced but transposed. [6]

Or

6. (*a*) With neat diagram, derive an expression for capacitance of single phase transmission line considering effect of earth. [6]

(*b*) A 3-phase, 132 kV, 50 Hz transmission line consist of three conductors each of diameter 21 mm. The spacing between conductors is as follows :

A–B = 3 m, B–C = 5 m, C–A = 3.6 m. If the line length is 100 km, find charging current per phase. [7]

7. (*a*) Express the relationship for sending end voltage and current in terms of receiving end voltage and current for medium length transmission line with nominal 'Π' method of representation. Draw the phasor diagram. [6]

(*b*) Classify transmission lines based on length, voltage and line constants. [6]

Or

8. (*a*) What do you understand by medium transmission lines ? How capacitance effects are taken into account in such lines ? [6]

(*b*) With necessary phasor diagram, deduce an expression for sending end voltage of a short transmission line in terms of line parameters. [6]