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

Seat No.	

[5152]-546

S.E. (Electrical) (II Sem.) EXAMINATION, 2017
POWER SYSTEM–I
(2015 PATTERN)

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

N.B. **:—** (*i*) Answer Q. No. **1** *or* Q. No. **2**, Q. No. **3** *or* Q. No. **4**, Q. No. **5** *or* Q. No. **6**, Q. No. **7** *or* Q. No. **8**.
(*ii*) Neat diagrams must be drawn wherever necessary.
(*iii*) Figures to the right indicate full marks.
(*iv*) Assume suitable data, if necessary.

1. (*a*) With necessary diagram, derive the expression for string efficiency of string insulators consisting of four discs. [6]

(*b*) A generating station has the following daily load cycle : [6]

Time (hrs.)	Load (MW)
0—6	40
6—10	50
10—12	60
12—16	50
16—20	70
20—24	80

Draw the load curve and find :
(*i*) Unit generated per day
(*ii*) Average load
(*iii*) Load factor.

P.T.O.

Or

2. (*a*) Explain various objectives and characteristics of tariff. [6]

(*b*) Explain function and operation of the following power plant equipments in brief. [6]

(*i*) PLCC Equipment

(*ii*) Isolators.

3. (*a*) Derive an expression for the inductance of a 3-phase overhead lines with unsymmetrical spacing. [7]

(*b*) Explain XLPE cable along with its advantages over other type of cable. [6]

Or

4. (*a*) The test results for 1 km of 3-phase metal sheathed cable gave a measured capacitance of 0.7 μF between one conductor and the other two conductors bunched together with sheath and 1.2 μF measured between the three bunched conductors and the sheath. Find capacitance between two conductors and charging current when cable is connected to 11 kV, 50 Hz supply. [7]

(*b*) Explain in brief the following effects associated with transmission lines : [6]

(*i*) Skin Effect

(*ii*) Proximity Effect.

5. (*a*) Derive an expression for capacitance per km of single phase overhead line having distance 'D' meter between the conductors and radius '*r*' meter of each conductor without considering effect of earth. Hence explain how to find charging current from capacitance. [6]

(*b*) A three-phase 110 kV, 100 km, 50 Hz overhead line conductors are placed in a horizontal plane with distance between adjacent conductors as 6 m. The conductor diameter is 1.5 cm. Assuming complete transposition of line : [6]

Calculate :

(*i*) Capacitance per phase

(*ii*) Charging current per phase.

Or

6. (*a*) Derive the expression for capacitance of three phase transmission line when conductors are unsymmetrically placed but transposed . [6]

(*b*) A 3-phase double circuit line is shown in figure 1. Find capacitance to neutral per km. Diameter of each conductor is 2.5 cm. [6]

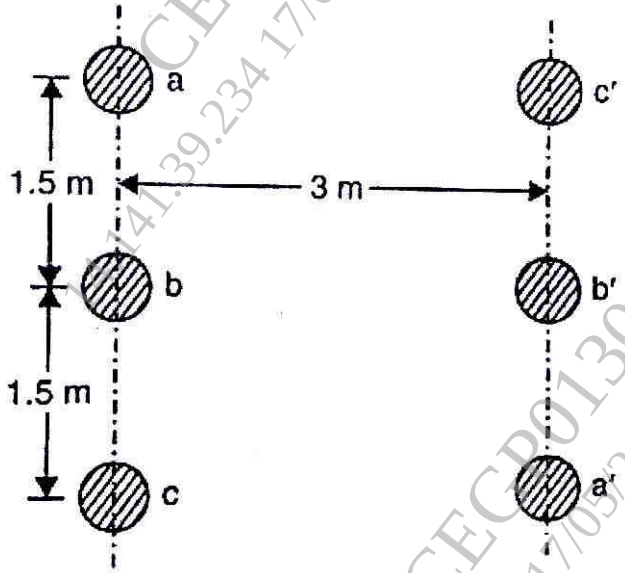

Fig. 1

7. (*a*) With neat diagram and usual notations, prove that for any transmission line with generalised circuit constants as ABCD, AD – BC = 1. [6]

(*b*) A three phase, 50 Hz, 150 km line has a resistance, inductive reactance and capacitive shunt admittance of 0.1 Ω, 0.5 Ω and 3×10^{-6} S per km per phase. If the line deliver 50 MW at 110 KV and 0.8 power factor lagging. Determine :

(1) sending end voltage

(2) sending end current

(3) sending end power factor.

Assume Nominal 'Pi' method. [7]

Or

8. (*a*) With neat circuit diagram, derive expression for ABCD constants of short transmission line. Draw neat phasor diagram hence state properties of short transmission line. [6]

(*b*) The ABCD constants of 3 phase 132 kV transmission line connected to 50 MW, 0.85 lagging power factor load are :

$A = D = 0.9531 \angle 0.6^{\circ}$, $B = 93.75 \angle 78.29^{\circ}$ Ω

and $C = 0.001 \angle 90^{\circ}$S

Determine Sending end voltage, current, power factor and efficiency of transmission using nominal 'T' method. [7]