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

Seat No.	

[5152]-146

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

POWER SYSTEM—I

(2012 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*) Discuss advantages and limitations of interconnected grid system. [6]

(*b*) Explain in brief the necessity and working of the following equipments used in substation : [6]

(*i*) Busbars

(*ii*) Reactors.

Or

2. (*a*) What is meant by tariff ? What are the objectives of tariff ? [6]

(*b*) A 3-phase line is supported by a string of 3 suspension type disc insulators. The voltage across the disc nearest to the

P.T.O.

line is 20 kV and that across the adjacent units is 15 kV. Find :

(*i*) ratio of the capacitance of joint to capacitance of disc

(*ii*) System line voltage

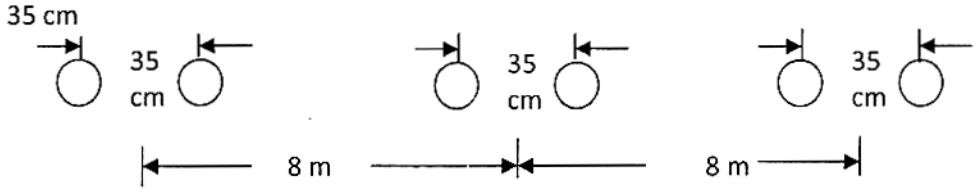
(*iii*) String efficiency. [6]

3. (*a*) Define Sag and Span of a transmission line. With neat diagram derive an expression for sag when the supports are at equal level. [7]

(*b*) What is meant by transposition of conductors in an overhead line ? Why is it essential ? How is it carried out ? [6]

Or

4. (*a*) A three-phase single circuit bundled conductor line with two sub-conductors per phase has horizontal spacing with 8 m between the centre lines of adjacent phases. The distance between the sub-conductors of each phase is 35 cm and each sub-conductor has a diameter of 2.8 cm. Find the inductance per phase per km of the line. [7]



(*b*) Derive an expression for capacitance of a single core cable. [6]

5. (*a*) Derive an expression for capacitance of 1-phase transmission line without considering effect of earth. [6]

(*b*) A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in horizontal plane 4.5 m apart. Conductor diameter is 22.4 mm. Line length is 200 km. Calculate charging current per phase assuming complete transposition. [6]

Or

6. (*a*) Capacitance of single-phase, 50 km long transmission line considering effect of earth is 0.225 μF. Overhead line consisting of two parallel conductors each of 0.5 cm diameter and 1.5 m apart. Calculate height of conductors above the ground. [6]

(*b*) Derive an expression for capacitance of 3-phase transmission line when conductors are unsymmetrically spaced but transposed. [7]

7. (*a*) Evaluate the generalized circuit constants for medium transmission line with Nominal 'π' method. [6]

(*b*) Obtain the expression of voltage regulation and efficiency of short transmission line in terms of line parameters. [6]

Or

8. (*a*) With neat circuit diagram, prove that for any transmission line with generalized circuit constants as ABCD, value of AD – BC = 1. [6]

(*b*) The A, B, C, D constants of a 3-phase transmission line are

$$A = D = 0.978 + j\ 0.051,$$

$$B = 28.47 + j\ 106.25\ \Omega \text{ and}$$

$$C = j5^* 10^{-4} \text{ mho.}$$

The load at the receiving end is 40 MW at 200 kV and 0.8 lagging power factor. Determine sending end voltage and % regulation of line. [6]