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

Seat No.	

[4757]-1036

S.E. (Electrical) (Second Semester) EXAMINATION, 2015

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*) Figures to the right indicate full marks.

(*iii*) Assume suitable data if necessary and state the same clearly.

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

(*v*) Use of electronic pocket calculator is allowed.

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

(*b*) Discuss the necessity of excitation systems for alternaters. Explain any *one* type of excitation system used for alternator in brief. [6]

Or

2. (*a*) An yearly load duration curve of a gas turbine power plant is straight line from 48,000 kW to 5000 kW. The load is taken by power plant which consists of two units of 20,000 kW each and one unit of 10,000 kW. Determine : [6]

(1) Load factor

(2) Capacity factor of plant.

P.T.O.

(*b*) Name the different types of insulators used in power system ? Explain the applications of each type of insulators. [6]

3. (*a*) Derive the expression for sag for unequal supports ? What is the effect of ice and wind loading ? [8]

(*b*) In a three-phase transmission line, three conductors are spaced at equal distance from each other i.e. 2.5 m. The diameter of each conductor is 1.3 cm. Find inductance per kilometer length of line. [5]

Or

4. (*a*) Derive the expression for internal and external flux linkages of conductor carrying current 'I' ampere and derive expression for inductance of single-phase line. [7]

(*b*) Give the classification of underground cables. [6]

5. (*a*) Derive an expression for line to neutral capacitance of three-phase overhead transmission line with unsymmetrical spacing of conductors. Assume complete transposition. [8]

(*b*) A single-phase transmission line has two parallel conductors 3.5 m apart from each other. The radius of each conductor is 1.5 cm. Calculate capacitance of line per kilometer. Assume $\varepsilon_r = 1$. [4]

Or

6. (*a*) Derive the equation for capacitance per kilometer of a single phase overheads transmission line having distance 'D' between conductors and '*r*' is radius of each conductors. [6]

(*b*) Explain the methods of images in determining the effect of earth on capacitance calculation for overhead transmission lines. [6]

7. (*a*) Determine generalized circuit constants of short transmission line. State its characteristics. [6]

(*b*) A medium single-phase transmission line 100 kg long has the following constants : [7]

R/km = 0.25 Ω

Reactance 1 km = 0.8 Ω

Susceptance 1 km = 14×10^{-6} (siemens)

Receiving end voltage = 66,000 V

Assume that total capacitance of line is located at receiving end alone. Determine :

(1) Sending end current

(2) Sending end voltage

(3) Regulation

(4) Supply power factor.

The line is delivering 15,000 kW at 0.8 p.f. (lagg).

Or

8. (*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 'T' method of representation. Draw neat circuit diagram and phasor diagram. [7]

(*b*) A three-phase transmission line, 132 kV is connected to a 50 MW load at p.f. of 0.85 (lagg). The line constants of 80 km long line are z = 96 $\angle$ 78 Ω and Y = 0.001 $\angle$ 90 (S) Using nominal 'T' circuit representation Calcualte. A, B, C and D constants of transmission line. [6]