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

Seat No.	

[5352]-546

S.E. (Electrical) (II Sem.) EXAMINATION, 2018
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.

Q1 a) Explain in brief, what are base load and peak load plants hence explain advantages of interconnected grid system [6]

b) Explain various methods of improving string efficiency [6]

OR

Q2 a) With neat diagram, explain construction and advantages of following types of insulators [6]
i) Pin Insulator
ii) String Insulator

b) The maximum demand of consumer is 20 A at 230 V and his total energy consumption is 8760 kWh. If the energy is charged at 3 Rs per unit for 400 Hrs of maximum demand per annum plus 6.5 Rs per unit for additional units, calculate annual bill [6]

Q3 a) Derive an expression for loop inductance of a 1 phase overhead lines [6]

b) Diameter of conductor of transmission line is 1.3 cm. Maximum permissible sag with a horizontal wind pressure per meter length of 1.6 kg and with ice loading per meter of 1.1 kg is 5.4 m. Calculate permissible span between two supports at the same level. [7]
Braking stress of conductor = 4300 kg/cm^2
Weight of conductor per meter length = 1.2 kg
Factor of safety = 2.5

P.T.O.

OR

Q4 a) Derive the expression for flux linkages [7]
i) Due to a single current carrying conductor
ii) In parallel current carrying conductors

b) A single core, 5 km long cable having core diameter of 0.9 cm and insulation of relative permittivity of 4.2 and 1.1 cm thickness, is connected to 33 kV, 50 Hz supply. Find capacitance of cable also find maximum and minimum stress in insulation [6]

Q5 a) What do you understand by electric potential? Derive an expression for electric potential at [6]
i) Charged single conductor
ii) Conductor in a group of charged conductors

b) A 3 phase 50 Hz, 66 kV overhead line conductors A, B and C are placed in horizontal plane. Distance between conductors A and B is 2.3 m, B and C is 2.2 m. Diameter of each conductor is 1.3 cm. If the line length is 125 km calculate [6]
(i) Capacitance per phase
(ii) Charging current per phase
Assume complete transposition of the line

OR

Q6 a) Derive the expression for capacitance of 3 phase double circuit line when conductors are arranged in the form of regular hexagon of side 'd' meters [6]

b) A single phase transmission line has two parallel conductors 2 m apart, the diameter of each conductor is 0.7 cm and conductors are placed 8 m above the ground. Calculate line to neutral capacitance for line length of 100 km [6]
i) Neglecting effect of ground
ii) Considering effect of ground

Q7 a) Obtain the relationship between sending end voltage and current in terms of receiving end voltage and current for a medium transmission line using nominal 'T' method. Draw neat phasor diagram. [7]

b) A 3 phase, 50 Hz, 16 km long overhead line supplies 1000 kW at 11 kV, 0.8 pf lagging. The line resistance is 0.03 Ω per phase per km and line inductance is 0.7 mH per phase per km. Calculate sending end voltage and regulation of line [6]

OR

Q8 a) With neat circuit diagram, derive expression for ABCD constants of medium transmission line 'π' model. hence state properties of medium transmission line [6]

b) A 3 phase, 50 Hz, transmission line delivers 50 MVA at 0.8 pf lagging and at 110 kV. Generalized circuit constants of line are as follows [7]
A =D = 0.98 $\angle$ 3° , B = 110 $\angle$ 75° Ω, C = 0.0005 $\angle$ 80° S. Calculate sending end voltage and sending end current and sending end power factor