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

Seat No.	

[5559]-155

S.E. (Electrical) (Second Semester) EXAMINATION, 2019

POWER SYSTEM—I

(2015 PATTERN)

Time : 2 Hours **Maximum Marks : 50**

Instructions to the candidates:

1) ***Answer Q1or Q2,Q3or Q4,Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume Suitable data if necessary***

Q1) a) A consumer has following connected load: 10 lamps of 60 W each and two heaters of 1000 W each. His maximum demand is 1500 W. On the average he uses 8 lamps 5 hours a day and each heater for 3 hours a day. Find his average load, monthly energy consumption and load factor [6]

b) Define string efficiency hence explain what are various methods to improve string efficiency [6]

OR

Q2) a) State necessity of excitation system in power plant hence explain any one type of excitation system with suitable diagram [6]

b) Calculate annual bill of a consumer whose maximum demand is 100 kW, p.f. 0.8 lagging and load factor of 0.6. the tariff used is Rs. 75/kVA of MD + 15 Paise / kWh consumed [6]

Q3) a) Overhead line consist of copper conductor having cross sectional area of 2.5 cm^2. Calculate the vertical sag for a span of 250 meters, weight of conductor = 1.8 kg/m, Ultimate strength = 8000 kg/cm^2, Wind pressure = 40 kg/cm^2 of projected area, Factor of safety = 3 [7]

b) Derive the expression for loop inductance of 1 phase 2 wire transmission line [6]

P.T.O.

OR

Q4) a) Prove that g_{max} / g_{min} in a single core cable is equal to D/d [6]

b) Derive the expression for internal and external flux linkages of conductor [7]

Q5) a) Derive the expression for capacitance of single phase transmission line considering effect of earth [6]

b) A 3 phase, 50 Hz, 132 kV overhead transmission line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. if the line length is 100 km, calculate the charging current per phase assuming complete transposition. [6]

OR

Q6) a) Find the capacitance and charging current of 66 kV, 50 Hz single phase transmission line 40 km long consisting of 2 parallel conductors each 5 mm in diameter and 1.5 m apart and placed 7 m above earth surface [6]

i) Without considering earth effect

ii) Considering earth effect

b) Derive the expression for capacitance of 3 phase double circuit line when conductors are arrange in the form of regular hexagon [6]

Q7) a) Draw neat representation of short transmission line hence draw its phasor diagram [3]

b) A 3 phase, 132 kV, 50 Hz overhead transmission line has the following line parameters [10]

Resistance = 28 Ω

Inductive reactance = 63 Ω

Capacitive susceptance = $4 * 10^{-4}$S

If the load at the receiving end is 60 MW at 0.8 pf lagging, calculate

i) Sending end voltage

ii) Sending end current

iii) Sending end power factor

iv) Regulation

v) Efficiency

Use nominal T Method

OR

Q8) a) With neat diagram deduce the relationship between sending end and receiving end quantities in medium transmission lines using nominal Π method. Draw neat phasor diagram [7]

b) Find the following for single circuit transmission line delivering a load of 50 MVA at 110 kV at 0.8 pf lagging [6]

i) Sending end Voltage

ii) Sending end Current

iii) Sending end Power factor

Given : A = D = 0.98 ∠3°, B = 110∠75° Ω; $C = 0.0005\angle 80° Siemen$