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

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No.</td><td></td></tr>
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[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　[6]
　　　　 explain advantages of interconnected grid system

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

OR

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

　　b)　The maximum demand of consumer is 20 A at 230 V and his total　[6]
　　　　 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

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

　　b)　Diameter of conductor of transmission line is 1.3 cm. Maximum　[7]
　　　　 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.
　　　　 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   [6]
        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

Q5 a) What do you understand by electric potential? Derive an expression   [6]
        for electric potential at
        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   [6]
        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
        (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   [6]
        when conductors are arranged in the form of regular hexagon of
        side 'd' meters

    b) A single phase transmission line has two parallel conductors 2 m   [6]
        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
        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   [7]
        diagram.

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