Registration No :

Total Number of Pages : 03   **B.Tech.**
PEE4G001

4th **Semester Regular / Back Examination 2017-18**
ELECTRICAL POWER TRANSMISSION & DISTRIBUTION
BRANCH : ELECTRICAL
Time : 3 Hours
Max Marks : 100
Q.CODE : C1152
Answer Part-A which is compulsory and any four from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1   **Answer the following questions :**   **(2 x 10)**
   a) For the same voltage drop, increasing the voltage of a distributor n-times
        i)   Reduces the x-section of the conductor by n-times
        ii) Increases the x-section of the conductor by n-times
        iii) Reduces the x-section of the conductor by n^2-times
        iv) Increases the x-section of the conductor byn^2-times
   b) The approximate cost ratio of 220 kV, underground cable and 220kV
        overhead transmission is
        i)   50
        ii) 25
        iii) 13
        iv) 5
   c) Feeders are designed mainly from the point of view of
        i)   its current rating capacity
        ii) voltage drop in it
        iii) operating voltage
        iv) operating frequency
   d) Conductors used in HV transmission lines are stranded because of
        i)   increase tensile strength
        ii) ease of handling
        iii) cheaper in cost
        iv) reduced resistivity
   e) Effect of temperature rise in overhead lines is to
        i)   increase the sag and decrease the tension
        ii) decrease the sag and increase the tension
        iii) increase both
        iv) decrease both
   f) The inductance of a single phase two wire power transmission line per km
        gets doubled when the
        i)   distance between the wires is doubled
        ii) distance between the wires is increased four fold
        iii) the distance between the wires is increased as square of the original
             distance
        iv) radius of the wire is doubled
   g) High voltage transmission lines are transposed because then
        i)   corona losses can be minimized
        ii) computation of inductance becomes easier
        iii) voltage drop in the lines can be minimized
        iv) phase voltage imbalances can be minimized

h) Ferranti effect happens in transmission line when the line is
    i)   short and loaded
    ii) long and loaded
    iii) long and unloaded
    iv) none of these
i) The intersheaths in cables are used to
    i)   provide proper stress distribution
    ii) minimizes stress
    iii) use inferior insulation
    iv) provide protection against moisture and voltage surges.
j) In an HVDC system
    i)   both generation and distribution are dc
    ii) generation is ac and distribution is dc
    iii) generation is dc and distribution is ac
    iv) both generation and distribution are ac.

Q2   **Answer the following questions:** *Short answer type :*   **(2 x 10)**
**a)** Why we need per unit system in case of analysis of transmission system?
b) What is derating of transmission lines?
c) Draw the phasor diagram of medium transmission line (PI method).
d) What do you understand by GMR and GMD of stranded conductor?
e) What is proximity effect?
f) How 3 wire transmission system is converted to 4 wire distribution system?
g) What will happen when power factor is leading in distribution of power?
h) What is a ring distributor? State any two advantages of ring main system.
i) What are service mains? How are the connected?
j) Mention the demerits of HVDC transmission.

Part – B (Answer any four questions)

Q3 **a)** Differentiate between bundled conductor and composite conductors. Find the inductance of a single phase line of composite conductors.   **(10)**

    b) In a single phase line (See. Fig.), conductors a and a'in parallel form one circuit while conductors b and b'in parallel form the return path. Calculate the total inductance of the line per km assuming that current is equally shared by the two parallel conductors. Conductor diameter in 2·0 cm.   **(5)**
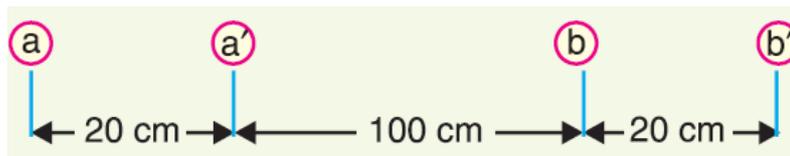
Q4 **a)** Derive the capacitance of a single phase (see figure) line considering the effect of earth.   **(10)**
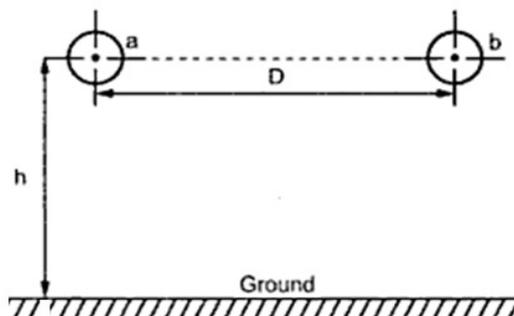
b) A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km, calculate the charging current per phase assuming complete transposition. **(5)**
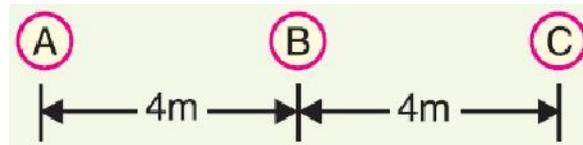
Q5 a) What do you mean by sag? Calculate sag (i) when the supports are at equal levels (ii) when the supports are at unequal levels. **(10)**

b) A transmission line has a span of 275 m between level supports. The conductor has an effective diameter of 1·96 cm and weighs 0·865 kg/m. Its ultimate strength is 8060 kg. If the conductor has ice coating of radial thickness 1·27 cm and is subjected to a wind pressure of 3·9 gm/cm^2 of projected area, calculate sag for a safety factor of 2. Weight of 1 c.c. of ice is 0·91 gm. **(5)**

Q6 a) What do you mean by string efficiency? Derive the mathematical expression for string efficiency for a string three insulators. Discuss different methods of improving string efficiency. **(10)**

b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find (i) the distribution of voltage over 3 insulators and (ii) string efficiency. **(5)**

Q7 a) With neat diagram compare AC and DC transmission systems. Discuss their merits and demerits. **(10)**

b) A 2-wire d.c. distributor AB is fed from both ends. At feeding point A, the voltage is maintained as at 230 V and at B 235 V. The total length of the distributor is 200 metres and loads are tapped off as under :
25 A at 50 metres from A ; 50 A at 75 metres from A
30 A at 100 metres from A ; 40 A at 150 metres from A
The resistance per kilometre of one conductor is 0·3 Ω. Calculate :
(i) currents in various sections of the distributor
(ii) minimum voltage and the point at which it occurs **(5)**

Q8 a) Discuss different types of reactive power compensators. Compare static and dynamic compensators **(10)**

b) A 3-phase, 50 Hz transmission line 100 km long delivers 20 MW at 0·9 p.f.lagging and at 110 kV. The resistance and reactance of the line per phase per km are 0·2 ohmand 0·4 ohmrespectively, while capacitance admittance is 2·5 micro Siemen/km/phase. Calculate: (i) the current and voltage at the sending end (ii) efficiency of transmission. Use nominal T method. **(5)**

Q9 a) What are the advantages and disadvantages of underground cables? What do you mean by grading of cables? Explain different methods of grading of cables. **(10)**

b) With neat diagram explain Kelvin's law for conductor size. What are its limitations? **(5)**