Registration No: | | | | | | | | | | |

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

PEL4I104

4th Semester Regular / Back Examination 2017-18
ELECTRICAL POWER TRANSMISSION & DISTRIBUTION
BRANCH: EEE
Time: 3 Hours
Max Marks: 100
Q.CODE: C896

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) If the length of the line is decreased, its capacitance is ..... .

b) When the regulation is positive, then receiving and voltage (V_R) is ..... than sending and voltage(V_S).

c) The dimensions of constants *B* and *C* are respectively ..... and ..... .

d) A metallic sheath is provided over the insulation to protect the cable from .....

e) The main consideration in the design of a feeder is the .....

f) The power factor of an a.c. circuit is given by ..... power divided by ..... power.

g) If sag in an overhead line increases, tension in the line .....

h) Suspension type insulators are used for voltages beyond .....

i) If capacitance between two conductors of a 3-phase line is 4 microFarad, then capacitance of each conductor to neutral is ..... .

j) ……. and …….. are examples of dynamic and static compensator respectively.

Q2 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Define terms : feeder, distributor and service mains.

b) What is derating of transmission lines?

c) Draw the phasor diagram of medium transmission line (end condenser method).

d) Why we need per unit system in case of analysis of transmission system?

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 do you mean by step voltage and touch voltage?

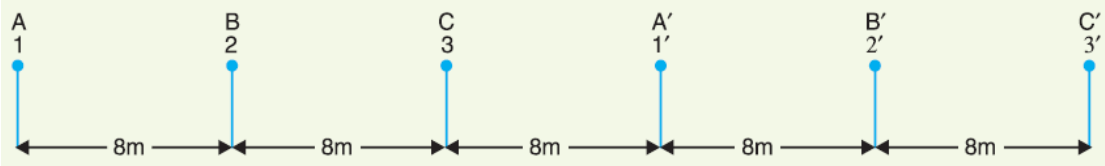
j) What do you understand by VAR compensation? Why it is required?

Part – B (Answer any four questions)

Q3 **a)** Differentiate between bundled conductor and composite conductors. Derive **(10)**

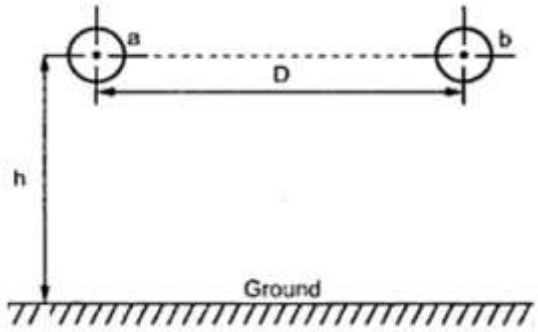
Inductance of a 3-phase overhead line with unsymmetrical spacing and show how transposition helps in overcoming the demerits.

b) Calculate the inductance per phase per metre for a three-phase double-circuit line whose phase conductors have a radius of 5·3 cm with the horizontal conductor arrangement as shown in Figure shown below. **(5)**



Q4 **a)** Draw the equivalent circuit and phasor diagram of transmission line (end condenser method). Hence derive the ABCD parameters of the above. Also check the condition of symmetry and reciprocity. **(10)**

b) Derive the capacitance of a single phase (see figure) line considering the effect of earth. **(5)**



Q5 **a)** An overhead transmission line conductor having a parabolic configuration weighs 1·925 kg per metre of length. The area of X-section of the conductor is 2·2 cm^2 and the ultimate strength is 8000 kg/cm^2. The supports are 600 m apart having 15 m difference of levels. Calculate the sag from the taller of the two supports which must be allowed so that the factor of safety shall be 5. Assume that ice load is 1 kg per metre run and there is no wind pressure. **(10)**

b) What do you mean by sag? Derive the expression for sag when the supports are at unequal levels. **(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) Each conductor of a 3-phase high-voltage transmission line is suspended by a string of 4 suspension type disc insulators. If the potential difference across the second unit from top is 13·2 kV and across the third from top is 18 kV, determine the voltage between conductors. Find the string sufficiency. **(5)**

Q7 **a)** Two conductors of a d.c. distributor cable AB 1000 m long have a total resistance of 0·1 Ω. The ends A and B are fed at 240 V. The cable is uniformly loaded at 0·5 A per metre length and has concentrated loads of 120 A, 60 A, 100 A and 40 A at points distant 200 m, 400 m, 700 m and 900 m respectively from the end A. Calculate (i) the point of minimum potential (ii) currents supplied from ends A and B (iii) the value of minimum potential. **(10)**

b) With neat diagram compare AC and DC distribution systems. Discuss their merits and demerits. **(5)**

Q8 **a)** 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 **(10)**

km are 0·2 Ω and 0·4 Ω respectively, while capacitance admittance is 2·5 × 10− 6 siemen/km/phase. Calculate: (i) the current and voltage at the sending end (ii) efficiency of transmission. Use nominal T method.

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

Q9 **a)** A d.c. ring main ABCDA is fed from point A from a 250 V supply and the resistances (including both lead and return) of various sections are as follows : AB = 0·02 Ω ; BC = 0·018 Ω ; CD = 0·025 Ω and DA = 0·02 Ω. The main supplies loads of 150 A at B ; 300 A at C and 250 A at D. Determine the voltage at each load point. If the points A and C are linked through an interconnector of resistance 0·02 Ω, determine the new voltage at each load point. **(10)**

b) What are the advantages and disadvantages of underground cables? What do you mean by grading of cables? Explain different methods of grading of cables. **(5)**