M	inoufiya University
Fe	culty of Engineering
SI	ebin El-Kom
Fi	rst Semester Examination
D	ate: 22/1/2014
Ti	me allowed: 3 Hours



Department: Electrical Engineering Year: 2nd Academic Year: 2013-2014 Course: Electrical Power Engineering (1)

Course Code: ELE 211

[120 Marks]

Answer all the following questions

[20 Marks]

- **Question** (1) (a) Drive a formula for the inductance of a fully transposed three phase transmission line with (8 Marks) unsymmetrical spaced conductors.
- (b) A 100 km three-phase bundled conductor line with two sub-conductors per phase the conductors are arranged as shown in Figure. Each phase has its bundled conductors with distance of 15 cm apart and each sub conductor has a diameter of 2 cm. If the specific resistance of the conductor is 1.73 $\mu\Omega$.cm, $\epsilon_0 = 8.85 \times 10^{-12}$ F/m. For each phase, calculate:
 - The total resistance,
 - The total inductance, 0
 - The total capacitance.



(12 Marks) [20 Marks]

Ouestion (2)

- (a) Drive the expressions for the general constants of medium-T line and draw the phasor diagram (8 Marks) at lag, lead and unity power factors.
- (b) A three-phase 150 km, 50 Hz transmission line has the following constants;

 $A = 0.9 \angle 2^{\circ}$ and $C = 0.004 \angle 90^{\circ}$

The value of power losses is 11 MW with transmission efficiency of 90%. The load voltage is 110 kV and load power factor is 0.8 lagging. If the line is represented by nominal-T method, calculate:

- The parameters of the line: R, L and C. .
- The voltage, current and power factor at the sending-end.
- The Voltage regulation. •

(12 Marks) [20 Marks] Question (3)

(a) What is the function of the transmission line supports? List different types of transmission line supports and clarify the length of span in each type.

(4 Marks)

(b) What is the function of the cross-arms? Explain with clear drawing the different types of crossarms.

(4 Marks)

An overhead line is erected across a span of 250 m on level supports. The conductor has a (c) diameter of 1.4 cm, and has a dead weight of 1.1 kg/m. The line is coated with a layer of ice with radial thickness of 1 cm. The line is subjected to wind pressure of 37.8 kg/m² of the projected area. Calculate the sag (a) in the inclined direction, (b) in the vertical direction. Assume a maximum working stress 1050 kg/cm². One cubic meter weighs 915 kg. (12 Marks)

