



## COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Prof. Hussein El Desouki

Course : Introduction To Power Engineering

Course Code : EE 341

Marks : 40

Date : 31/5/2015

Time : 11:30 – 1:30

### Final Exam

#### Question (1):

- a) Explain with neat sketch the main elements of power system.  
[A1 – B11] (3 marks)
- b) Compare between the costs of a three phase three wire system and that of a three phase four wire system.  
Assuming that the power transmitted, the length of lines, power loss and maximum voltage to earth are the same in the two cases.  
[A1 – A2b – B11] (5 marks)

#### Question (2):

- a) A 50 Hz three phase, three wire overhead line has solid cylindrical conductors arranged in the form of an equilateral triangle with 6 ft conductor spacing, conductor diameter is 0.6 inch. Calculate the positive sequence inductance in H/m and the positive sequence inductive reactance in  $\Omega/\text{Km}$ . Also calculate the positive sequence shunt capacitance in F/m and the positive sequence shunt admittance in S/Km.  
[A4 – B2] (4 marks)
- b) A three phase transmission line has the following parameters:
- $R = 0.074 \Omega/\text{Km}$ .
  - $L = 12.12 \times 10^{-4} \text{ H/Km}$ .
  - $C = 9.577 \times 10^{-9} \text{ F/Km}$ .

If the line is 150 Km long, find the equivalent circuit elements using the nominal  $\pi$  model. If the line is open circuited and energized to a voltage level of 230 KV as measured at the sending end, find the voltage at the open end. System frequency is 50 Hz.

Hint: 
$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} = \begin{bmatrix} (1 + \frac{ZY}{2}) & Z \\ Y(1 + \frac{ZY}{4}) & (1 + \frac{ZY}{2}) \end{bmatrix} \quad [A4 - B2] (4 \text{ marks})$$

Members of Course Examination Committee:	Signature:	Date:
Lecturer: Prof: Hussein El Desouki		17-5-2015
Course Coordinator: Prof: Amany Hanafy		17-5-2015
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