



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Prof. Hussein El Desouki

Course : Introduction to Power

Course Code : EE 341

Marks : 40

Date : 17/1/2016

Time: 2 hour

Final Exam

Question (1) (8 Marks)

A) Compare between the cost of overhead conductors in the following systems:

- i- Single-Phase ,two wire AC system. (A1-A2-B11)
- ii- Three-Phase , three wire AC system.

Assume that the transmitted power, the length of the lines, and the maximum voltage to earth are the same in both cases.

B) A bundled 230 KV, 50Hz, three-phase completely transposed overhead line has two copper hard drawn conductors of size 800 kcmil per bundle, with 46cm between conductors in the bundle. The flat horizontal phase spacing between bundle centres is 8 m. (A4 - B2)

Determine the following:

- i- Positive sequence inductive reactance in Ω/km .
- i- Positive sequence shunt admittance in S/km .

Question (2): (8 Marks) (A26 - B11)

A) Define what is Corona and mention the main disadvantages of Corona and how to mitigate it.

B) Find the disruptive critical corona voltage and visual corona voltage for 3-phase 200 KV line consisting of 22.26 mm diameter conductors spaced in a 6m delta configuration. The following data can be assumed: temp. 25°C, pressure is 73 cm of mercury, surface factor 0.84.

Question (3): (8 Marks) (A4 - B2)

A) A 200km long ,3 phase overhead line has a resistance of 48.8 Ω/phase , inductive reactance of 80.2 Ω/phase and capacitance (line to neutral) 8.42nF/phase. It supplies a load of 13.5 MW at a voltage of 88 KV and power factor of 0.9 lagging. Using the nominal T circuit, Find the sending end voltage, sending end current, system efficiency and power angle.

Hint : $A=D=1+\frac{ZY}{2}$, $B = Z(1+\frac{ZY}{4})$, $C = Y$.

Members of course Examination Committee:	Signature:	Date:
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B) An overhead transmission line is supported between two towers with 250 m between them. Also, there is a vertical difference between the two towers of 10m. The specific weight of the conductor is $0.006 \text{ kg/mm}^2/\text{m}$ and the maximum tension not to exceed 10 kg/mm^2 . What will be the position of the lowest point of the conductor relative to supports, maximum sag and the actual length of the transmission line? (A4 - B3)

Question (4): (8 Marks)

A) A three phase, 50Hz transmission line has the following parameters:

$R=0.15 \text{ } \Omega/\text{Km}$ (A26 - B11)

$L=2.1 \text{ mH/Km}$

$C=0.007 \text{ } \mu\text{F/Km}$

If the line is 500km long and delivers 1000 MW at 500 KV, 0.85 lag power factor, determine:

- I. The sending end voltage and current.
- II. The sending end power and power factor.
- III. The efficiency of the transmission line.

B) A 3 phase OHTL is being supported by three disk suspension insulator. The potential across the first and second insulator are 8 and 10 KV respectively.

Find: i-The capacitance ratio "m". ii-The line voltage. (A21 - C18)

Question (5) (8 Marks)

A) Draw with neat sketch the single core cable indicating its parts. (A4 - D3)

B) The maximum and minimum dielectric stresses on the dielectric of a single core cable are 50 KV/cm and 15 KV/cm respectively. If the conductor diameter is 3 cm, find:

-The thickness of the insulation.

-The operating voltage. (A26 - C18)

GOOD LUCK

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