



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Staff

Course : Electrical Power

Course Code: EE 448

Date : 25/5/2015

Marks: 40

Time : 2 hours

Final Exam

Answer the following questions:

1-a) Compare between the costs of overhead conductors in the following cases:

- DC, 2-wire system.
- AC, 3-phase, 3-wire system.

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

1-b) A 3-phase, 50 Hz, 150km long overhead transmission line has the following parameters per phase per km: resistance = 0.1Ω , inductive reactance = 0.2Ω and capacitive susceptance = $0.04 \times 10^{-4} S$. When the line is supplying a load of 120 MW at 220 kV and 0.8 p.f. leading, determine using the nominal Π -method the line efficiency and voltage regulation.

(10 marks)

2.a) A 230kV, 60 Hz, three-phase overhead line has one conductor per phase and a flat horizontal form with 8m between adjacent conductors. The conductor diameter is 1.5cm. Calculate the line inductance in H/m and shunt capacitance in F/m.

2.b) For the circuit in Fig 1, the voltages at feeding points F1 and F2 are respectively 300 and 270 volt. The loading currents and the go and return resistances of each section of the feeder are indicated in the figure. Find the point of the minimum voltage and the value of the voltage at this point.

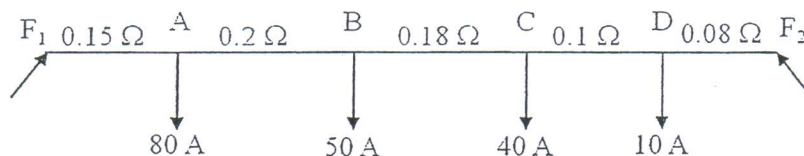


Fig.1

(10 marks)

Members of course Examination Committee:	Signature:	Date:
Lecturer: Prof.Dr. Amany Hanafy		25/5/2015
Course Coordinator : Prof.Dr. Amany Hanafy		25/5/2015
Head of Department: Prof.Dr. Hamdy Ashour		25/5/2015

3.a) A single phase a.c. distributor AB 300 m long is fed from end A and is loaded as:

(i) 100 A at 0.707 p.f. lagging 200 m from point A

(ii) 200 A at 0.8 p.f. lagging 300 m from point A

The resistance and reactance of the distributor is 0.2Ω and 0.1Ω per km. Calculate the total voltage drop in the distributor. The voltage at the far end is maintained at 250 V and the load power factors refer to the voltage at the far end point.

3.b) An overhead transmission line is supported between two towers with 200 m between them. The specific weight of the conductor is $0.005 \text{ kg/mm}^2/\text{m}$ and the maximum tension must not exceed 10 kg/mm^2 . What will be the height of the towers so that the clearance at the lowest point of the conductor does not drop below 15 m?

(10 marks)

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

i) the thickness of the insulation.

ii) the operating voltage.

4.b) Consider the power system shown in Fig.2 in which a synchronous generator supplies a synchronous motor. The motor is operating at rated voltage and rated MVA when a three phase symmetrical fault occurs at its terminals. Calculate the fault current that flow from both the generator and the motor. Choose a base of 50 MVA and 20 kV in the circuit of the generator.

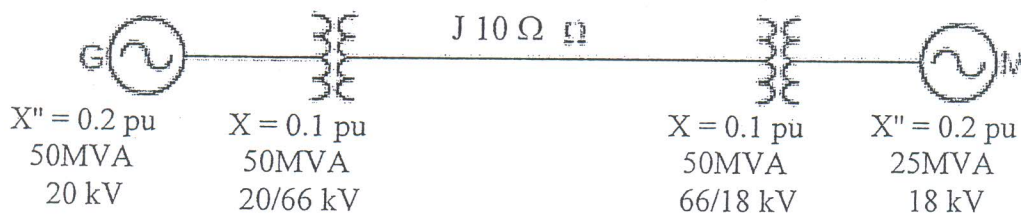


Fig.2

(10 marks)

Members of course Examination Committee:	Signature:	Date:
Lecturer: Prof.Dr. Amany Hanafy	<i>A</i>	25/ 5 /2015
Course Coordinator : Prof.Dr. Amany Hanafy	<i>A</i>	25/ 5 /2015
Head of Department: Prof.Dr. Hamdy Ashour	<i>Hamdy</i>	25/ 5 /2015