COLLEGE OF ENGINEERING & TECHNOLOGY

Program: : **Electrical & Computer Control Engineering**
Lecturer : **Dr. Fathalla fereig selim**
Course : **Electrical Power in Ships**
Course Code : **EE 449T** **Marks: 40**
Date : **25 / 5 / 2015** **Time : 2 hour**

Final Exam

Answer the following questions;

1) A single phase a.c. system supplies a load of 100 kW and if this system is converted to 3-phase, 3-wire a.c. system by running a third similar conductor, calculate the 3-phase load that can now be supplied if the voltage between the conductors is the same. Assume the power factor and transmission efficiency to be the same in the two cases.

(6 marks)

2) A 2-wire d.c. distributor ABCDEA in the form of a ring main is fed at point A at 240 V and is loaded as under : 12 A at B ; 18 A at C ; 25 A at D and 15 A at E.

The resistances of various sections (go and return) are : AB = 0·11 Ω ; BC = 0·06 Ω ; CD = 0·015 Ω ; DE = 0·027 Ω and EA = 0·08 Ω.

Determine:

(i) the point of minimum potential

(ii) current in each section of distributor

(6 marks)

3) A single phase a.c. distributor AB 500 meters long is fed from end A and is loaded as under:

(i) 100 A at 0·707 p.f. lagging 200 m from point A

(ii) 150 A at 0·86 p.f. lagging 500 m from point A

The load resistance and reactance of the distributor is 0·20 Ω and 0·10 Ω per kilometer. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.

(6 marks)

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P.T.O.

4) The insulation resistance of a single-core cable is 500 MΩ per km. If the core diameter is 3·4 cm and resistivity of insulation is $4{\cdot}7 \times 10^{13}$ Ω.cm, find the insulation thickness for 700 m length.

(6 marks)

5) The system shown in Figure 1 is initially on no load with generators operating at their rated voltage with their emfs in phase. The ratings are marked as shown in figure, all the resistances are neglected. The line impedance is j120 Ω, a three phase balanced fault occurs at the receiving end of the transmission line.
Determine the short circuit current totally and the generator and motor fault current in two cases :

1- The motor does not share the fault current

2- The motor shares the fault current (synchronous motor)

(8 marks)

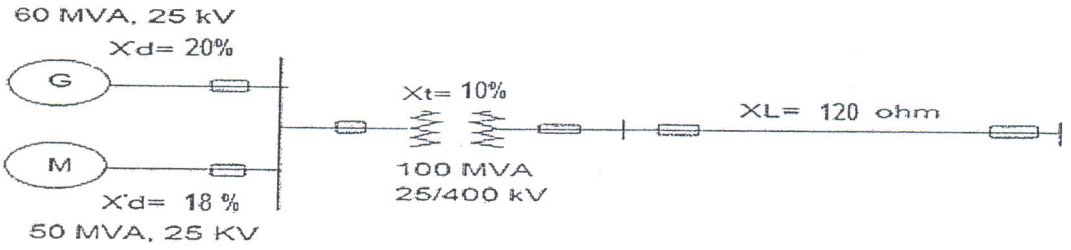
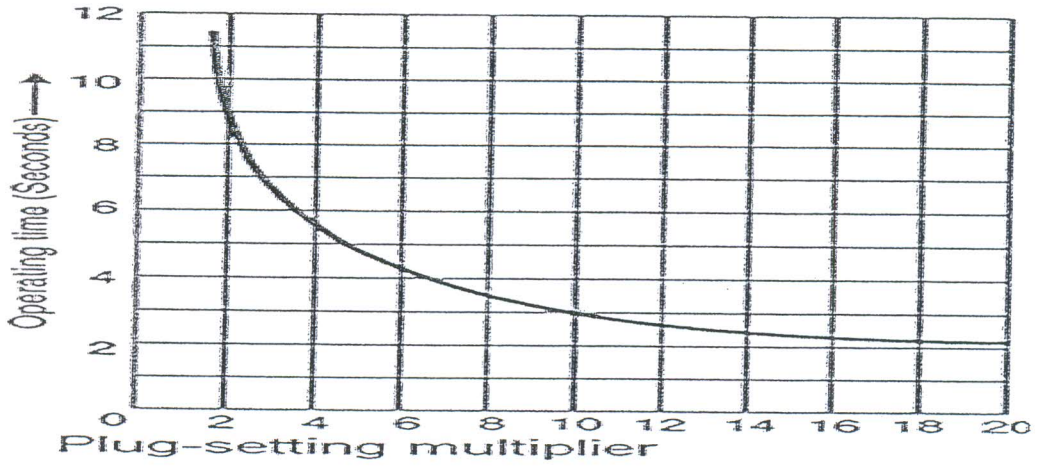


Figure 1

6) Determine the operation time of a 5-ampere, overcurrent relay having a current setting of 80% and a time setting multiplier of 0.15 connected to supply circuit through a 500/5 current transformer when the circuit carries a fault current of 3200 A. Use the time-plug setting multiplier curve shown in the figure. If the actual operating time is 0.45 sec, what is the actual circuit fault current.

(8 marks)



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