Solucion Examen DIC 2018

Parte (a)

Red:

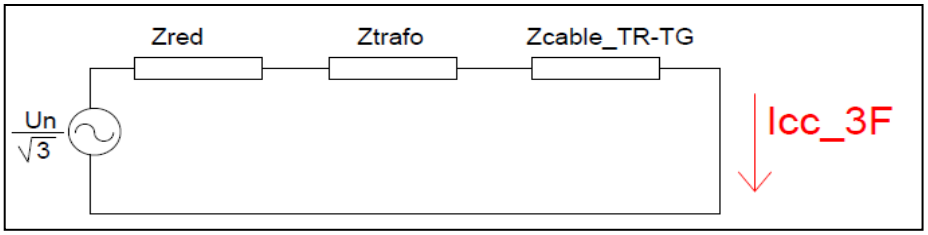
Scc=inf.	→	Zred(Ω)=	0	Un(V):	400

Trafo:

Sn(kVA):	1000	→	In(A):	1443	Ztr(mΩ):	1,92+7,76618310368742i
ucc(%):	5%					
|Ztr|=ucc . U^2/Sn =		8	mΩ			
Pcu (W)=	12000					
Pcu=3 . Rtr . In^2	→	Rtr=	1,92	mΩ		
Xtr=raiz(|Ztr|^2-Rtr^2) =		7,77	mΩ			

Cable TR-TG: (3x240 por fase)

Rc=ρ . L / S =	1,875	mΩ	Zc(mΩ):	0,625+0,5333333333333333i
Xc=xc . L =	1,6	mΩ		



Zequiv(mΩ)= 2,545+8,29951643702075i Icc_3F(kA): =Un/RAIZ(3)/|Zequiv| = 26,60 → PdC> 26,60 kA

|Zequiv(mΩ)|: 8,68095606

Parte (b)

2 Motores de Pn=15kW
cos φ =0,85 → S(kVA)= 17,65 → Q(kVAr)= 9,30

SL(kVA)= raiz[(P+1,25 . P)^2+(Q+1,25 . Q)^2] = 39,71 → IL(A)= 57,3

S(mm^2)	I(A)	Iz=Itabla x fa x ft (siendo fa x f=1)
10	52	X
16	67	OK → S(mm2)= 16
25	86	OK
35	103	OK

ΔU= raiz(3).Id.(R .cosφ+X.senφ)=	13,10	V	→	ΔU/Un=	3,28% < 4%

Id(A)=	50,9	
R=ρ . L / S =	0,17	Ω
X=xc . L =	0,0096	Ω
cos φ =	0,85	
sen φ =	0,53	

Parte (c)

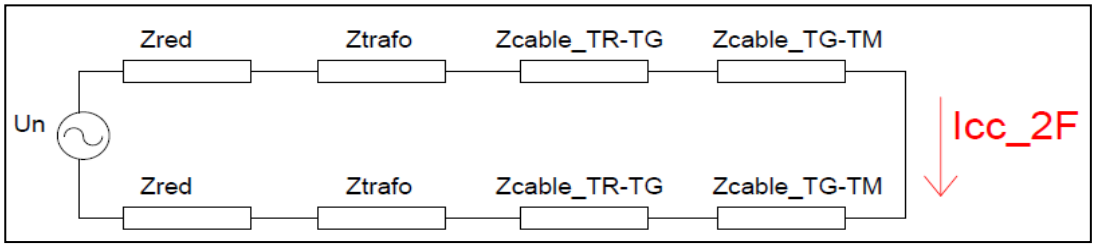
IL< Ir< Iz → 57,3A < Ir < 67A → In= 63A → Im=10xIn=630A

PdC > Icc_max → PdC > 26,60kA (parte a)

(I^2 x t) < (KS)^2 → (I^2 x t) < (115x16)^2= 3385600 A^2.s

Im< Icc_min → Im< 1,16kA

Como el circuito entre el TG y T.Motores no tiene neutro, Icc_mín=Icc_FF en bornes del T.Motores:



Zred(Ω)=	0
Ztrafo(mΩ):	1,92+7,76618310368742i
Zc_TR-TG(mΩ):	0,625+0,5333333333333333i
Zc_TG-TM(mΩ):	168,75+9,6i

→ Zequiv(mΩ)=Zred+Ztrafo+Zc_TR-TG+Zc_TG-TM= 171,295+17,8995164370208i

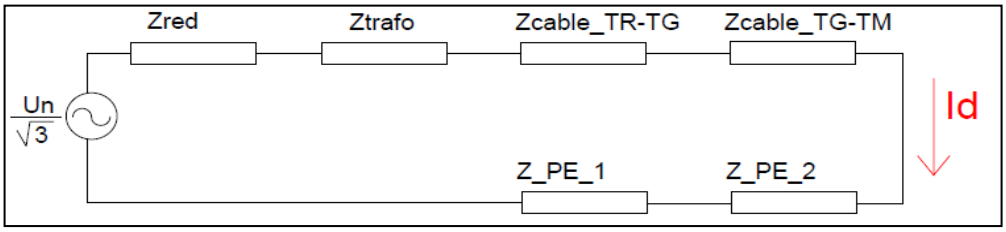
|Zequiv(mΩ)| = 172,2

Icc_2F= Un/(2.|Zequiv|)= 1,16 kA

Parte (d)

HIP: X_PE≈0 Ω

Se debe verificar que Im < Id y que tap < tmax_seg @ Uc



Z_PE1= ρ . L / S1 =	9	mΩ	Zequiv(mΩ)=Zred+Ztrafo+Zc_TR-TG+Zc_TG-TM+Z_PE2+Z_PE1=	349,045+17,8995164370208i
Z_PE2= ρ . L / S2 =	168,75	mΩ	|Zequiv(mΩ)| =	349,5
			Id= Un/raiz(3)/|Zequiv|)=	661 A

In= 63A → Im=10xIn=630A → Se verifica que Im < Id

Por otro lado, el tablero esta a la intemperie → Local mojado

Uc=Zpe. Id= (Zpe1+Zpe2) . Id = 117,5 V → tmax_seg @ Uc=117V: 0,18 s

Asumiendo que tap < 180ms, se puede concluir que el interruptor protege contra contactos indirectos.