EE4503 Tut 4.2

1-Phase: $S = VI$, $P = S \times pf$ 3-Phase: $S = \sqrt{3} VI$, $P = S \times pf$

	When immediate on Transient kVA	Steady state kVA	
a)	$S = 7.58$ kVA same as steady state as starting current = steady state current	$S = (72 \times 100)/0.95$ $= 7.58$ kVA	1-Phase, $V = 230$ V
b)	$S = 27.6$ kVA same as steady state as starting current = steady state current	$S = 6 \times 230 \times 20$ $= 27.6$ kVA	1-Phase, $V = 230$ V
c)	$I_{transient} = 6 \times I = 489$ A $S_{transient} = 112.5$ kVA	$S = (3 \times 5000)/0.8$ $= 18.75$ kVA	$I = 18.75 \times 10^3 / 230$ $= 81.52$ A 1-Phase, $V = 230$ V
d)	$I_{transient} = 6 \times I = 112$ A $S_{transient} = 77.6$ kVA	$S = (11000 \times 1)/0.85$ $= 12.94$ kVA	$I = 12.94 \times 10^3 / (\sqrt{3} \times 400)$ $= 18.68$ A 3-Phase, $V = 400$ V
e)	$I_{transient} = 2.5 \times I = 212$ A $S_{transient} = 147$ kVA	$S = (50000 \times 1)/0.85$ $= 58.8$ kVA	$I = 58.8 \times 10^3 / (\sqrt{3} \times 400)$ $= 84.9$ A 3-Phase, $V = 400$ V

Combo	Case 1	Case 2
①	$S_T = a)_{tran} = 7.58$ kVA	$S_T = e)_{tran} = 147$ kVA
②	$S_T = a)_{ss} + b)_{tran} = 35.18$ kVA	$S_T = e)_{ss} + d)_{tran} = 136.4$ kVA
③	$S_T = a)_{ss} + b)_{ss} + c)_{tran} = 147.68$ kVA	$S_T = e)_{ss} + d)_{ss} + c)_{tran} = 184.24$ kVA
④	$S_T = a)_{ss} + b)_{ss} + c)_{ss} + d)_{tran} = 131.53$ kVA	$S_T = e)_{ss} + d)_{ss} + c)_{ss} + b)_{tran} = 118.09$ kVA
⑤	$S_T = a)_{ss} + b)_{ss} + c)_{ss} + d)_{ss} + e)_{tran} = 213.87$ kVA	$S_T = e)_{ss} + d)_{ss} + c)_{ss} + b)_{ss} + a)_{tran} = 125.67$ kVA
⑥	$S_T = a)_{ss} + b)_{ss} + c)_{ss} + d)_{ss} + e)_{ss} = 125.67$ kVA	$S_T = e)_{ss} + d)_{ss} + c)_{ss} + b)_{ss} + a)_{ss} = 125.67$ kVA

For case 1, highest $S_T = 213.87$ kVA

For case 2, highest $S_T = 184.24$ kVA

Standard rating of generator will be given

$\therefore$ ~~Transformer~~ Generator capacity = 250 kVA

$\therefore$ Generator capacity = 200 kVA