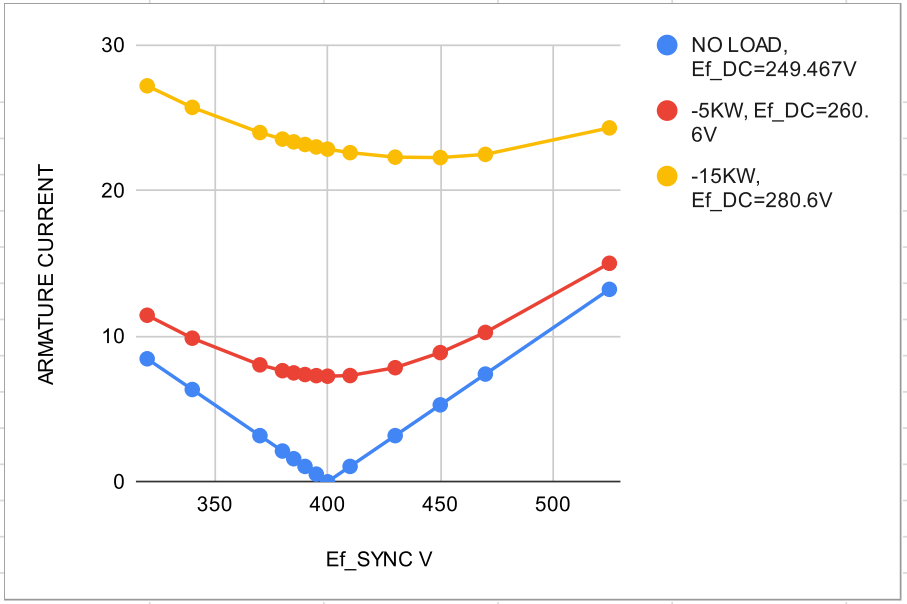
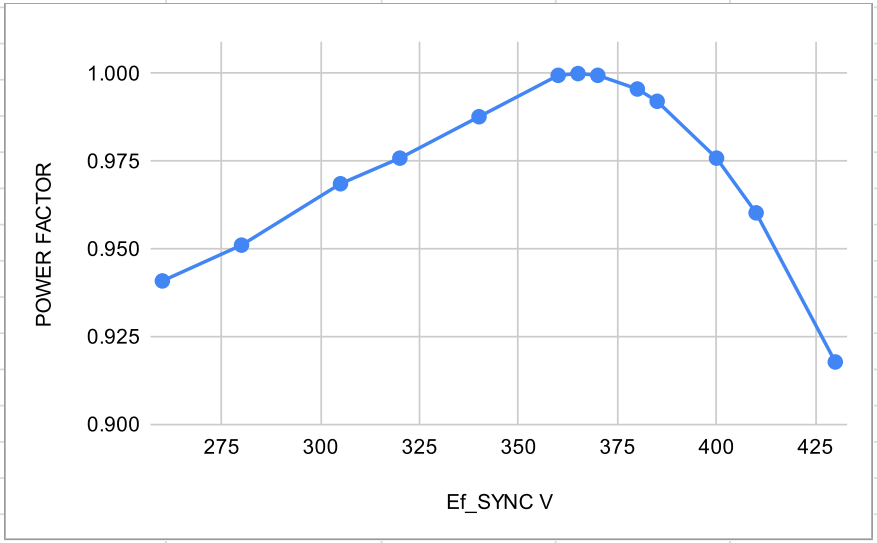
Ef_SYNC V	ARMATURE CURRENT-NO LOAD, Ef_DC=249.467V	ARMATURE CURRENT-5KW, Ef_DC=260.6V	ARMATURE CURRENT-15KW, Ef_DC=280.6V
320	8.45	11.44	27.2
340	6.339	9.865	25.72
370	3.17	8.033	23.99
380	2.113	7.632	23.54
385	1.585	7.482	23.35
390	1.057	7.368	23.17
395	0.5284	7.292	23
400	0.000936	7.254	22.85
410	1.057	7.298	22.61
430	3.171	7.838	22.3
450	5.285	8.875	22.27
470	7.399	10.26	22.49
525	13.22	15.01	24.31



POWER=-10.01KW, Ef_DC=271V	
Ef_SYNC V	POWER FACTOR
260	0.9409
280	0.9511
305	0.9686
320	0.9759
340	0.9877
360	0.9995
365	1
370	0.9995
380	0.9956
385	0.9921
400	0.9759
410	0.9603
430	0.9178



__/__/__

Discussion Questions:-

(1) Frequency of alternator is slightly higher than grid freq. So that angular speed of rotation of bus voltage and alternator terminal voltage is different. This ensures that the phase difference between 2 phasors keep changing from 0-360°. This helps in knowing when alternator terminal voltage and bus voltage are in phase. At that points, the lamp becomes dark. Then the breaker is closed and alternator terminals and grid is connected. This ensures alternator voltage doesn't suffer from sudden and large change in voltage phase.

(2) Wrong synchronisation can lead to potential damage to synchronous machine. When synchronous machine is connected to grid, electrical and mechanical systems are connected. Before closing breaker, angular velocity of rotating magnetic field and freq of voltage induced in stator are governed by rotor speed.

After switch is closed, angular velocity is governed by grid freq. Rotor and prime mover have to change speeds immediately to match the grid system. In wrong synchronisation this immediate change in speed leads to large transient torque on mechanical system. This leads to damage to synchronous machine.

(3). Decreasing value of field voltage. Supplied to DC machine, decreases field current. So DC machine field current is decreased, power generated by synchronous machine increases and at some point, synchronous machine power goes from -ve to +ve. Then synchronous machine is working as a generator supplying power to the grid.

(4) Max. voltage seen by bulbs is the sum of output voltage of alternators. This happens when voltages are 180° out of phase. So voltage rating of bulbs should be 800V.