Power Electronics Project

ID	Task	Member/s	Duration	Due Date
1	***Project Definition & Planning***	*Compulsory for all members*	3 days	-
1.1	Define project goals and specifications (voltage, power rating, THD target)	*Compulsory for all members*	-	-
1.2	Research SHE control technique for single-phase inverters	*Compulsory for all members*	-	-
1.3	Identify necessary components (switches, driver ICs, filter elements)	*Compulsory for all members*	-	-
2	***Project Planning***	-	3 Days	-
2.1	Design inverter circuit schematic in Proteus (power stage, control circuit)	-	-	-
2.2	Select appropriate switches and driver ICs based on voltage and current ratings	-	-	-
2.3	• Design output filter for THD reduction (consider LC or LCL filters)	-	-	-
2.4	• Simulate inverter operation in Proteus (DC input, AC output waveforms)	-	-	-
2.5	• Analyze THD in Proteus simulation	-	-	-
3	***SHE Control Algorithm Development***	-	4 Days	-
3.1	• Develop SHE control algorithm in MATLAB (m-file)	-	-	-
3.2	• Implement SHE algorithm for single-phase inverter control (harmonic selection, switching strategy)	-	-	-
3.3	• Simulate SHE control algorithm in MATLAB (DC input, desired AC output)	-	-	-

ID	Task	Member	Duration	Due Date
3.4	• Analyze THD in MATLAB simulation using FFT and compare with Proteus results	-	-	-
4	***Microcontroller Programming***	-	**3 Days**	-
4.1	• Develop control code for STM32 to implement SHE algorithm (PWM generation, communication with driver ICs)	-	-	-
4.2	• Simulate microcontroller code with model of inverter circuit (may require additional tools)	-	-	-
5	***PCB Design & Fabrication***	-	**4 Days**	-
5.1	• Translate inverter schematic into PCB layout in Proteus (consider component placement, routing)	-	-	-
5.2	• Ensure proper power plane design, grounding, and heat dissipation	-	-	-
5.3	• Generate fabrication files (Gerber files) and order PCB from manufacturer	-	-	-
5.4	• Review and verify PCB design before fabrication	-	-	-
6	***Hardware Assembly & Testing***	-	**3 Days**	-
6.1	• fabricate PCB	-	-	-
6.2	• Assemble PCB with all necessary components (switches, drivers, microcontroller)	-	-	-
6.3	• Perform initial power-up and basic functionality tests (voltage checks)	-	-	-

ID	Task	Member	Duration	Due Date
7	***Inverter Testing & Optimization***	-	**2 Days**	-
7.1	• **Connect inverter to DC power supply and controlled AC load** • **Implement control code on STM32 and test inverter operation**	-	-	-
7.2	• Measure output voltage waveform and analyze THD using oscilloscope or power analyzer	-	-	-
7.3	• Fine-tune SHE control algorithm parameters for optimal THD performance	-	-	-
8	***Documentation & Report***	-	**4 Days**	-
8.1	• Prepare project report including design details, simulation results, hardware testing data, hardware prototype finishing	-	-	-
8.2	• Document project challenges, solutions, and lessons learned	-	-	-
8.3	• troubleshooting any unexpected issues during simulation, programming, or hardware testing.	-	-	-