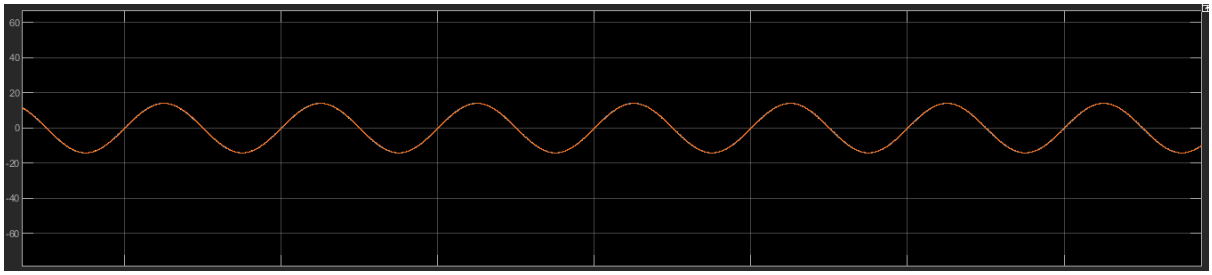
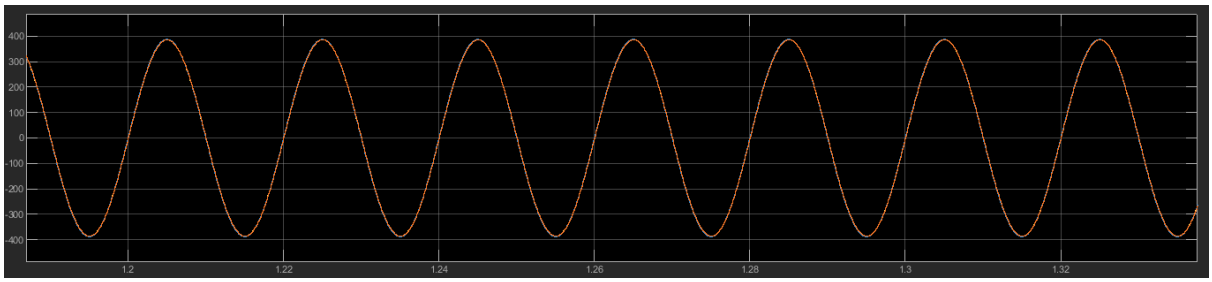
Discussion

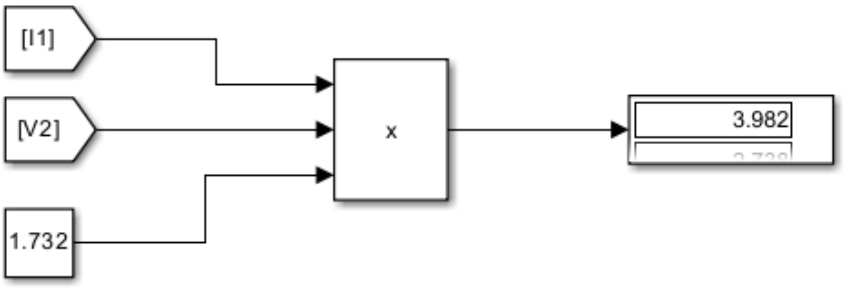
1. Plot voltage and current waveforms at the load by using a Scope/oscilloscope and hence calculate the load power.
   - Voltage waveform



   - Current Waveform



Load power = 3.982 W



2. Observe each generator power (Mw) contribution for the following load scenarios.

Load	Gas	Hydro	Diesel	V1	VG2	VG3	IG1	IG2	IG3
2MW	0.6	0.8	0.6	11	12.0	10	31.5	38.5	34.6
5MW	1	1.8	2.2	10.9	11.9	9.9	57.6	86.6	127
Full load	1	2.0	4.0	11	12.0	10	52.6	96.2	230

3. Discuss what happen when the load becomes 12 MW and verify this using simulation results. (Waveforms or any visible simulation outputs)

When the load is increased beyond the total generation capacity (12 MW > 7 MW available), the following effects are observed in simulation:
- Bus voltages start to drop significantly (below 0.9 pu).
- Generator currents increase sharply, exceeding nominal limits.
- The system frequency begins to decline, indicating generation shortage.
- The simulation may show generator overloading, tripping, or instability depending on protection settings.

At 12 MW demand, the generators cannot supply the required power, causing voltage collapse or frequency drop, leading to loss of synchronism or system shutdown unless additional grid support is available.

4. Calculate the total power loss for the 2 MW Load demand.

P_loss = P_gen,total - P_load
For the 2 MW load case:
P_loss = 2.05 MW - 2.00 MW = 0.05 MW

Final answer = 50 kW