As part of your course project, you are required to design and simulate one of the following planar resonator structures:

- Interdigitated Capacitor (IDC)
- Split Ring Resonator (SRR)
- Complementary Split Ring Resonator (CSRR)
- Multiple Split Ring Resonator (MSRR)
- Open Complementary Split Ring Resonator (OCSRR)
- Defected Ground Structure (DGS)
- Meander Line Resonator
- Spiral Inductor

You may also propose your own novel design, provided it resonates at **2.5 GHz or 5 GHz** and meets the required specifications.

S11 and S21 Design Targets for Planar Resonator Structures

Structure	**S11 Target**	**S21 Target**	**Comments**
Interdigitated Capacitor (IDC)	$S_{11} < -10\,\text{dB}$	$S_{21} > -3\,\text{dB}$	Passband behavior; good transmission
Split Ring Resonator (SRR)	$S_{11} < -10\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Notch filter behavior at resonance
Complementary SRR (CSRR)	$S_{11} < -10\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Etched in ground; strong rejection
Multiple SRR (MSRR)	$S_{11} < -12\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Higher sensitivity from multiple rings
Open CSRR (OCSRR)	$S_{11} < -12\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Enhanced field interaction
Defected Ground Structure (DGS)	$S_{11} < -10\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Stopband effect from ground slot
Meander Line Resonator	$S_{11} < -10\,\text{dB}$	$S_{21} > -3\,\text{dB}$	Compact size; passband or sensing application
Spiral Inductor	$S_{11} < -10\,\text{dB}$	$S_{21} < -10\,\text{dB}$	Magnetic field coupling; notch filter behavior

NOTE: These are for your reference, need to justify at the time of evaluation

Outstanding projects will be supported for publication in a reputed journal or conference
Project Specifications:

- Operating Frequency: Less than 6 GHz
- The structure should possess a low input reflection coefficient (S11) and a high forward transmission coefficient (S21), depending on the resonator type.
- Sensitivity: morethan 10%
- Size: as compact as possible

Additional Guidelines:

- Select dielectric substrate and metal based on available fabrication facilities.
- Projects with measured results will receive maximum marks.