(3 Hours) **Max Marks: 80**

1. Question No. 1 is compulsory
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required and justify the same.
4. Figures in brackets on the right hand side indicate full marks.

Q.1. (A) Explain briefly Green's function (05)
(B) Give a comparison of Conventional Microwave Circuits (CMC) with the Microwave Integrated Circuits (MIC). (05)
(C) List and explain various performance parameters of mixer. (05)
(D) Compare microwave amplifier versus microwave oscillators.

Q.2. (A) Explain Stability circles and its importance in amplifier design. (10)
(B) Describe key processing techniques used in making HMICs. (10)

Q.3. (A) Give design considerations of Coplanar wave guides. (10)
(B) Give limitations and criteria for the choice of substrate material in HMICS and MMICS. (10)

Q.4. (A) For two port oscillator at steady state oscillation, prove that if: $\Gamma_L\Gamma_{in} = 1$ then $\Gamma_T\Gamma_{out} = 1$. (10)
(B) Derive the dispersion relation for open microstrip line. (10)

Q.5. (20)

Design a class A power amplifier at 900 MHz using mRF-8585 NPN transistor with output power of 3 W. Design input and output impedance matching section for amplifier. Find the required input power and compute the power added efficiency. Use the given S-parameter to compute source and load reflection coefficient. $S_{11} = 0.94 \angle 164^\circ$, $S_{12} = 0.031 \angle 59^\circ$,

$S_{21} = 1.222 \angle 43^\circ$, $S_{22} = 0.57 \angle -165^\circ$

Q.6. (A) Describe the analysis of lange coupler assuming TEM propagation. (10)
(B) A BJT has the following *S*-parameters as a function of three frequencies. Determine in which of these cases, device is unconditionally stable and which has greatest stability. (10)

Freq. (MHz)	S_{11}	S_{12}	S_{21}	S_{22}
500	$0.70 \angle -57^\circ$	$0.04 \angle 47^\circ$	$10.5 \angle 136^\circ$	$0.79 \angle -33^\circ$
750	$0.56 \angle -78^\circ$	$0.05 \angle 33^\circ$	$8.6 \angle 122^\circ$	$0.66 \angle -42^\circ$
1000	$0.96 \angle -97^\circ$	$0.06 \angle 22^\circ$	$7.1 \angle 112^\circ$	$0.57 \angle -48^\circ$

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