Max Marks: 80
Duration: 03 Hrs.

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

1. (A) Explain how MMICs are superior over HMICs. (05)
   (B) Compare microwave amplifier versus microwave oscillators. (05)
   (C) Explain Stability circles and its importance in amplifier design. (05)
   (D) How coupled line parameters vary with frequency? (05)

2. (A) Describe key processing techniques used in making HMICs. (10)
   (B) For two port oscillator at steady state oscillation, prove that if: (10)
       $\Gamma_L\Gamma_{in} = 1$ then $\Gamma_T\Gamma_{out} = 1$.

3. (A) Discuss various mixers topology. Compare performance of them. (10)
       A BJT has the following S-parameters as a function of four frequencies.
   (B) Determine in which of these cases, device is unconditionally stable, and (10)
       of these, which has the greatest stability.

Device	S_{11}	S_{12}	S_{21}	S_{22}
A	$0.34\angle -170°$	$0.06\angle 70°$	$4.3\angle 80°$	$0.45\angle -25°$
B	$0.75\angle -60°$	$0.2\angle 70°$	$5.0\angle 90°$	$0.51\angle 60°$
C	$0.65\angle -140°$	$0.04\angle 60°$	$2.4\angle 50°$	$0.70\angle -65°$

4. A MESFET is biased for large signal Class A operation with the (20)
   following small signal S-parameters at 5 GHz: $S_{11} = 0.55\angle -150°$, S_{12}
   $= 0.04\angle 20°$, $S_{21} = 3.5\angle 170°$, and $S_{22} = 0.45\angle -30°$.
   The large signal forward transmission coefficient S_{21} is measured to be
   $S_{21} = 2.8\angle 180°$. Design a large-signal Class A amplifier with maximum
   transducer gain in a 50 Ω system. Assume ±0.5 dB error in gain. What
   is the high-power amplifier gain?

5. (A) Derive the dispersion relation for open microstrip line. (10)
   (B) Give limitations and criteria for the choice of substrate material in (10)
       HMICS and MMICS.

6. (A) Give design considerations of Coplanar wave guides. (10)
   (B) Explain green's function. (10)

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