Q.P.Code:13984

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 Stability circles and its importance in amplifier design.** **(05)**
(B) **Compare HMICs with MMICs.** **(05)**
(C) **Discuss microwave amplifier versus microwave oscillators.** **(05)**
(D) **List and explain various performance parameters of mixer.** **(05)**

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

3. (A) **Derive the transducer power gain as:** **(10)**

$$G_T = \frac{P_L}{P_{avg}} = \frac{|S_{21}|^2(1-|\Gamma_s|^2)(1-|\Gamma_L|^2)}{|1-\Gamma_s\Gamma_{in}|^2|1-S_{22}\Gamma_L|^2}$$

(B) **Explain Green's Function and discuss its application.** **(10)**

4. **Design an amplifier to have gain of 10 dB at 6 GHz using a transistor with the following s-parameters (Z_0 = 50 Ω) S_{11} = 0.61 ∠ -170°, S_{12} = 0, S_{21} = 2.24 ∠ 32°, S_{22} = 0.72 ∠ -83° Plot constant gain circles for Gs = 1 dB and GL = 2 dB. Use matching sections with open circuited shunt stubs.** **(20)**

5. (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) **Design a lange coupler with a center frequency of 4 GHz and with N = 4, C = 0.5 and Z_{on} = 30 Ω. Determine the line width and spicing required if an alumina substrate with h = 0.635 mm and ε_r = 9.8 is to be used.** **(10)**

6. (A) **Give briefs of Balanced FET Mixers.** **(10)**
(B) **Discuss amplifier linearization methods.** **(10)**
