

Con. 3445-08.

CO-4237

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of the remaining questions.
 (3) Use of **Smith chart** is **compulsory**.
 (4) **Illustrate** answers with **sketches**.

1. (a) A certain GaAs MESFET has the following S-parameter measured 16 at 9 GHz with 50 Ω reference—

$$S_{11} = 0.64 \angle -170^\circ$$

$$S_{12} = 0.05 \angle 15^\circ$$

$$S_{21} = 2.1 \angle 30^\circ$$

$$S_{22} = 0.57 \angle -95^\circ$$

- Compute (i) The delta factor Δ
 (ii) Stability factor k
 (iii) Find the center and radius of the o/p and i/p stability circle and plot the circle.

- (b) Define stability. List the various criteria for stability. 4

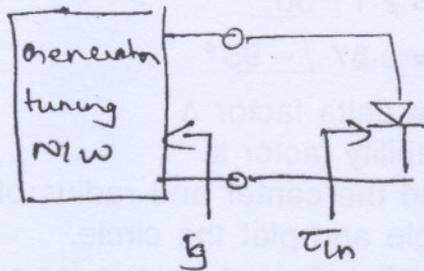
2. Design a LNA for a noise figure of 3.5 dB and a power gain of 16 dB. 20
 A bipolar Transistor has been selected and is biased at Midrange for Class A amplifier design : $V_{CE} = 4$ V, $I_C = 30$ mA. The S -parameter and the noise parameters at 1GHz are as follows :—

$$|S| = \begin{bmatrix} 0.7 \angle -105^\circ & -155^\circ \\ 5.0 \angle 180^\circ & 0.51 \angle -20^\circ \end{bmatrix}$$

$$F_{\min} = 3 \text{ dB} \quad f_{\text{opt}} = 0.45 \angle 180^\circ \quad R_n = 4 \Omega.$$

3. (a) Analyze a one port NR oscillator and explain Kurokawa's criteria. 10
 (b) Why S parameters are used in the analysis of Neuroware design ? 10
4. (a) Derive the expression for noise figure for multistage amplifier. 10
 (b) What is operating gain and how is it used in the power amplifier design ? 10

5. (a) A certain GaAs MESFET has the following noise figure parameters 12
 measured at $V_{ds} = 1v$, $I_{ds} = 20 \text{ mA}$ with a 50Ω resistance for a
 frequency of 9 GHz $f_{min} = 2 \text{ dB}$;
 $t_0 = 0.485 \angle 155^\circ$ $R_n = 4 \Omega$. Plot the noise figure circles for given val-
 ues of F_c at 3.0 and 4.0 dB .
- (b) Explain any two applications of PIN diodes. 8
6. (a) Explain Dielectric Resonator oscillator in brief. 4
 (b) Design a one-port oscillator using a tunnel diodes with $T_{IN} = 1.25 \angle 40^\circ$ 16
 at 8 GHz in a 50Ω system.



7. (a) Balanced Mixer
 (b) Varacter diode and its applications
 (c) Phase shifter
 (d) Dynamic range.