

(3 Hours)

[Total Marks :100

- B. : (1) Question No. 1 is compulsory.
 (2) Attempt any four questions from remaining six questions.
 (3) Use smith chart if necessary
 (4) Figures to the right indicate full marks.

- (a) Explain the terms conversion loss and Isolation with reference to mixer. 5
 (b) Find S- parameters of two port series network, $Z=500\Omega$ and $Z_0 = 50\Omega$. 5
 (c) Explain 1-dB compression point. 5
 (d) What are the characteristic of the power amplifier? 5

- (a) Derive the transducer Power Gain equation 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) A BJT has the following S- parameters. Is the transistor unconditionally stable? 10
 Draw input and output stability circle?
 $S_{11} = 0.65 \angle -95^\circ$, $S_{21} = 0.5 \angle 115^\circ$, $S_{12} = 0.035 \angle 40^\circ$, $S_{22} = 0.8 \angle -35^\circ$

- (a) For the two port network ABCD matrix is given by 10

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} = \begin{bmatrix} 0.5 & j1.6 \\ j1.6 & 0.5 \end{bmatrix}$$

Find scattering matrix if $Z_0 = 100\Omega$. Find condition of reciprocity.

- (b) Discuss various mixer topologies. Compare performance of them. 10

- (a) Discuss amplifier linearization methods. 10
 (b) Define and explain noise correlation matrix for general noise two port network. 10
 What is congruence transformation?

- (a) Explain broadband microwave amplifier using balance amplifier design technology. 10

- (b) Compare microwave amplifier with microwave oscillators. 10

[Turn Over

6. (a) Discusses generator tuning networks for microwave oscillators.
 (b) A GaAs FET is biased for minimum noise figure and has following S- parameters and noise parameters at 4 GHz ($Z_0 = 100\Omega$). Design an amplifier with 2dB noise figure maximum gain compatible with this noise figure. Assume device is unilateral.

$$S = \begin{bmatrix} 0.6 \angle -60^\circ & 0.05 \angle 26^\circ \\ 1.9 \angle 81^\circ & 0.5 \angle -60^\circ \end{bmatrix}$$

$$F_{\min} = 1.6\text{dB}, (\Gamma_{\text{opt}}) = 0.62 \angle 100^\circ, R_N = 20\Omega$$

7. Write short note on (any two):-
 (a) Noise figure test equipments
 (b) Power distributed amplifiers
 (c) Microwave resonators

SABOO SIDDIK COLLEGE OF ENGINEERING BYCULLA 5/12/2016 10:41:07 AM

M. H. SABOO SIDDIK COLLEGE

a,
b,
c,
d

a,
b

a,
b

a

b

a
b

a
b

5/11