BE-sem-VIII - EXTC-Old - AME

12/5/16

QP Code:629102

(3 Hours) | Total Marks :100

N.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.

1. (a) Explain the terms conversion loss and Isolation with reference to mixer. **5**
(b) Find S- parameters of two port series network, Z=500Ω and Z0 =50Ω. **5**
(c) Explain 1-dB compression point. **5**
(d) What are the characteristic of the power amplifier? **5**

2. (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?
$S_{11} = 0.65 <- 95^0$, $S_{21} = 0.5 <115^0$, $S_{12} = 0.035 < 40^0$, $S_{22} = 0.8 <-35^0$

3. (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 varies mixer topologies. Compare performance of them. **10**

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

5. (a) Explain broad band microwave amplifier using balance amplifier design technology. **10**
(b) Compare microwave amplifier with microwave oscillators. **10**

[Turn Over

6. (a) Discuses generator tuning networks for microwave oscillators. **10**

(b) A GaAs FET is biased for minimum nose 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. **10**

$$S = \begin{bmatrix} 0.6 < -60^0 & 0.05 < 26^0 \\ 1.9 < 81^0 & 0.5 < -60^0 \end{bmatrix}$$

$F_{min} = 1.6dB$, $(\Gamma_{opt}) = 0.62 < 100^0$, $R_N = 20\Omega$

7. Write short note on (any **two**):- **20**

(a) Noise figure test equipments

(b) Power distributed amplifiers

(c) Microwave resonators
