ME I sem - II Choice Based 24/11/12
ExtC
RF & microwave Engg

Q. P. Code: 25705

Total Marks: 80

(3 Hours)

N.B. : (1) Question number 1 is compulsory.
(2) Attempt any three questions from remaining questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data wherever necessary and indicate the same.

Q.1 Write a short note on following: [20]
(a) Strip lines
(b) Image Frequency in Mixers
(c) Dielectric Resonator Oscillator
(d) Microstrip lines.

Q.2 (a) How is Vector Network Analyzer used to measure periodic large signal waveform with all harmonics. [10]

(b) Design a transistor oscillator at 4 GHz using a GaAs MESFET in a common gate configuration, with a 5 nH inductor in series with the gate to increase the stability. Choose a terminating network to match to a 50 Ω load, and an appropriate tuning network .The scattering parameters of the transistor in a common source configuration are (Z_0= 50 Ω) S_{11}' = 2.18∠ -35°, S_{12}' = 1.26∠18°, S_{21}' =2.75∠96°, and S_{22}' = 0.52∠−155°. [10]

Q.3 (a) Draw the block diagram and explain scalar, passive, fundamental-frequency load/source pull. [10]

(b) Write a short note on Field Surveys. [10]

Q.4 (a) Explain Hybrid and Monolithic MIC by comparing the two MICs in the following areas Cost, size and weight, Design flexibility , Circuit tweaking and Reliability. [10]

(b) The s parameters for the HP HFET-102 FET at 2 GHZ with a bias voltage V_{gs}=0 are given as follows (Z_0=50 Ω) [10]
S_{11}= 0.894∠ -60.6°
S_{21}= 3.122∠ 123.6°
S_{12}= 0.020∠ 62.4°
S_{22}= 0.781∠ -27.6°
Determine the stability of this transistor by K- delta test and plot the stability circles on smith chart.

Q.5 Design an amplifier to have a gain of 11 dB at 4.0 GHz. Plot constant-gain circle for G_S = 2 and 3 dB, and G_L = 0 and 1 dB, Calculate and plot the input return loss and overall amplifier gain from 3 to 5 GHz. The transistor has the following scattering parameters (Z0 = 50 Ω): [20]

f (GHz)	S_{11}	S_{12}	S_{21}	S_{22}
3	0.80∠−90°	0	2.8∠100°	0.66∠ −50°
4	0.75 ∠−120°	0	2.5∠80°	0.60 ∠−70°
5	0.71∠ −140°	0	2.3∠60°	0.58∠−85°

Q.6 (a) Design an lumped impedance matching network using smith chart to match a load with an impedance Z_L =10+j10 Ω to a 50 Ω line at a frequency of 1GHz. [10]

(b) Draw and explain in detail Single-Ended Diode Mixer. [10]

(BCJ

M.E, Sem-II, EXTC

20/11/2017

Q.P. Code : 13565

(Time 3 Hours)

[Total Marks: 80]

N.B.: (1) Question No. **1** is **compulsory**.

(2) Solve any **three** from remaining **five** questions.

Q1. a) Explain various parameters associated with Eye Pattern. 20

b) Explain the concept of excess bandwidth and roll of factor.

c) Explain Rician and Rayleigh Channels

d) Explain Delta modulation Source Encoder and Decoder

Q2. (a) For a pair of letters find Huffman Code, entropy, average code length and efficiency 10

x1x1	0.20
x1x2	0.15
x2x1	0.15
x2x2	0.12
x1x3	0.09
x3x1	0.09
x2x3	0.07
x3x2	0.07
x3x3	0.04

(b) Describe the M-ary waveform receiver using whitening approach 10

Q3. (a) State and prove Nyquist criteria that gives the necessary and sufficient condition for the spectrum X (f) of pulse X (t) that yields Zero ISI. 10

(b) Explain in detail the optimum receivers in Rician channel

Q4. (a) Derive the equation for band limited signals with controlled ISI for Partial –Response signal 10

(b) Describe small scale fading in detail. Compare slow and fast fading. 10

Q5. (a) Design optimum receiver for 16-QAM signal and calculate the probability of correct reception of all 16 symbols and its mean energy 10

(b) Explain Binary cross correlation receivers using MAP decision theory 10

Q6. Write short note on any Two 20

1. Baye's detection of received signal
2. Relevant and irrelevant noise with example.
3. Linear equalizer with MSE criterion
4. Imperfect Carrier Synchronization effects