B.E Sem VIII EXTC (OLD) 17/12/15
AME

QP Code : 2640

(3 Hours) [Total Marks : 100

N.B. : (1) Question **No.1** is **compulsory.**
(2) **Solve** any **four** questions out of remaining **six** questions.
(3) **Use** of **smith chart** is **allowed.**
(4) **Figures** to the **right** indicate **full marks.**

1. (a) What is an unilateral figure of merit of an amplifier? 5
(b) Define signal to noise ratio and noise figure with help of a noisy network. 5
(c) Define stability. List the various criteria for stability. 5
(d) Explain the terms conversion loss and isolation with reference to mixer. 5

2. (a) For an ideal transformer with turns ratio $n = n_1/n_2$. Prove that the scattering matrix is : 10

$$S = \begin{bmatrix} \frac{n^2-1}{n^2+1} & \frac{2n}{n^2+1} \\ \frac{2n}{n^2+1} & \frac{1-n^2}{n^2+1} \end{bmatrix}$$

(b) Discuss amplifier linearization methods. 10

3. A GaAs FET has the following S-parameter and noise parameters at 1.0 GHz ($Z_0 = 50\ \Omega$) $S_{11} = 0.61 < -155^0$, $S_{12} = $ [illegible], $S_{21} = 5.0 < 180^0$, $S_{22} = 0.51 < -20^0$, $F_{min} = 3dB$, $\Gamma_{opt} = 0.45 < 180^0$, $R_N = 4\Omega$. Design a Low noise amplifier for a noise figure of 3.5dB and power gain of 16 dB. 20

4. (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) Design a transistor oscillator at 4 GHz using GaAs FET in common gate configuration with 5nH inductor in series. Common gate configuration S-parameters are $S_{11} = 2.18 < -35^0$, $S_{21} = 2.75 < 96^0$, $S_{12} = 1.26 < 18^0$, $S_{22} = 0.52 < 155^0$, Select Γ_T so that $\Gamma_{in} > 1$. 10 10

TURN OVER

5. (a) Explain using suitable diagrams two methods of designing broadband amplifier. 10
   (b) Discuss generator tuning networks for microwave oscillators. 10

6. (a) Explain in detail single ended diode mixer. Also explain mixer design aspects. 10
   (b) A BJT with $I_C = 30mA$ and $V_{CC} = 10$ V is operated at a frequency of 1.0 GHz in a 10
   50 Ω system.
   $S_{11} = 0.73 < 175^0$, $S_{22} = 0.21 < -89^0$, $S_{12} = 0.0$, $S_{21} = 4.45 < 65^0$
   Is the transistor unconditionally stable? If yes, calculate the optimum terminations.
   G_{Smax}, G_{Lmax} and G_{TUmax}.

7. Write short note on : 20
   (a) Noise figure test equipment
   (b) Comparison of microwave amplifier and oscillator
   (c) 1dB compression point
   (d) Properties of scattering matrix.

BE - SEM VIII (CR-2007) - EXTC Dec 2015
Wireless Networks

QP Code : **2991**

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory
(2) Attempt any four out of remaining q.no. 2 to 7
(3) Draw neat Sketches wherever required.
(4) Assume suitable data if required.

1. (a) Why is power control is important in CDMA? 5
(b) What is the difference between an ESS and a BSS in the IEEE 802.11? 5
(c) Discuss two evolution paths for the GSM to offer 3G Services. 5
(d) What is HSDPA? 5

2. (a) Differentiate between frequency hopping and direct-sequence spread spectrum. 10
(b) What are various states in Bluetooth System? Explain difference between them. 10

3. (a) What is a WPAN? What is the difference between WPAN and WLAN? Name two example technologies for WPAN. 10
(b) What is WAP? Discuss WAP architecture in brief. 10

4. (a) What is the UMTS? List important features of the UMTS air interface. 10
(b) Discuss forward and reverse link channels in the cdma 2000 10

5. (a) Explain Bluetooth protocol stack 10
(b) Explain sensor network protocol stack in detail. 10

6. (a) Explain link budget analysis and requirements of wireless networks. 10
(b) Discuss WiMAX. What are the main differences between the IEEE 802.116 (Wi-Fi) and WiMAX? 10

7. Write short notes on
(a) IEEE Project 802 10
(b) RFID 10

B.E. Sem VIII (R-2007) (EXTC).
IP

16/12/15

QP Code : 2721

(REVISED COURSE)

(3 Hours) [Total Marks: 100

N.B: 1. Question No 1 is Compulsory
2. Answer any 4 questions from the remaining questions

Q1 Write short notes on any four 20

a. Connectivity of pixels
b. Median filters
c. Slant transform
d. Edge detection
e. Thresholding and its application.

Q2 a. Explain Image formation in eye with neat diagram. 10
b. Explain the following filtering operations in spatial domain. 10
i. Low pass filtering ii. High pass filtering iii. High Boost filtering

Q3 a. Perform histogram Equalization for the following image. Plot the original and the Equalized Histograms. 10

Intensity	0	1	2	3	4	5	6	7
No.of pixels	130	100	40	60	40	80	10	40

b. With neat block diagram, explain the basics of filtering in the frequency domain. 10

Q4 a. Explain the method of segmentation of images by region splitting and region growing. 10
b. A source emits seven symbols with probabilities 0.1, 0.2, 0.06, 0.1, 0.2, 0.04 and 0.3. Find out Huffman code words and efficiency of the system. 10

Q5 a Explain following method of data compression indicating clearly whether they are lossy or lossless. Also state the type of redundancy. 10
i)Arithmetic Coding ii) IGS coding iii) Delta modulation iv) LZW coding
b. Calculate the DCT of the following image : 10

2	4	4	2
4	2	2	4
4	2	2	4
2	4	4	2

Q6 a. Derive a mathematical model for image degradation function. 10
b. Explain the use of Inverse filters and Wiener Filters for image restoration. 10

Q7 Write short notes on any two 20
a. Hotelling Transform
b. Homomorphic Filters
c. Hough transform
d. Image compression standards

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