

BE EXTC VIII (REV)
 Advanced microwave
 31/5/14 Engineering

QP Code : MV-19072

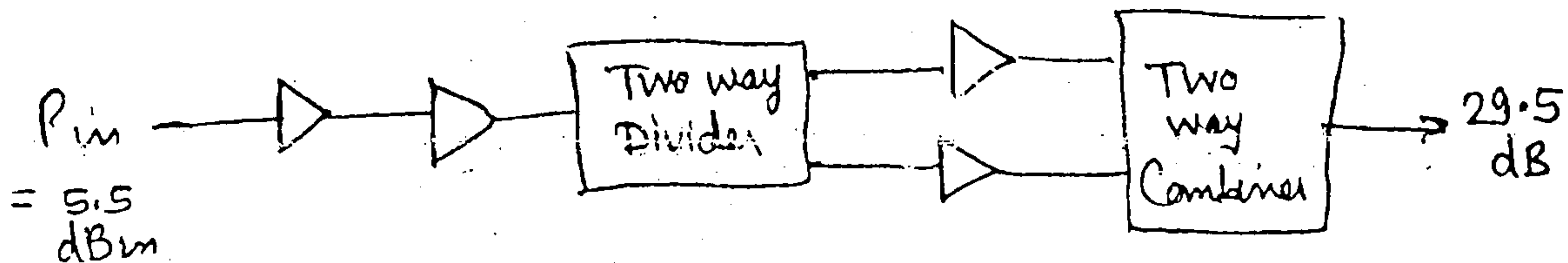
(3 Hours) 1100-200 [Total Marks : 100

- N.B.** (1) Question no. 1 is compulsory.
 (2) Attempt any four questions out of remaining six question.
 (3) Assume suitable data wherever necessary.

1. (a) Define signal to noise ratio and noise figure with help of a noisy network. Explain test set up to measure signal to noise ratio. 5
 (b) Prove that scattering matrix is symmetrical and reciprocal. 5
 (c) Explain unilateral figure of merit. 5
 (d) Explain the terms conversion loss and Isolation with reference to mixer. 5

2. (a) Consider two power BJT amplifiers used in circuit configuration shown below having following specifications : 10

Amplifier	Go(dB)	Gi(dB)	PidB(dBm)
1	8	7	27
2	10	9	22



Assume that operating frequency is 1 GHz and input power is 5.5dBm. Specify correct BJT amplifiers that must be used at each stage to obtain 29.5 dBm output power. Assume each two way divider / combiner has 0.5 dB insertion loss.

- (b) Discuss amplifier linearization methods. 10

3. (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) Define and explain noise correlation matrix for general noisy two port network. 10
 What is congruence transformation ?

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4. Design a transistor oscillator at 6 GHz using an FET in CS configuration driving a 50Ω load on drain side. The S-parameters at 50Ω are

$$S = \begin{bmatrix} 0.9 \angle 150 & 0.2 \angle -15 \\ 2.6 \angle 50 & 0.5 \angle 105 \end{bmatrix}$$

Calculate and plot output stability circle for $|\Gamma_{IN}| \gg 1$. Choose Γ_T so that $|\Gamma_{IN}| \gg 1$. Design load and terminating networks.

5. (a) Discuss various mixer topologies. Compare performance of various topologies. 10
(b) Discuss generalised single ended mixer design approach. Give design considerations. 10

6. (a) For a two port network the ABCD matrix is given as : 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 $Z_0 = 50 \Omega$. Find condition of reciprocity.

- (b) Discuss generator tuning networks for microwave oscillators. 10

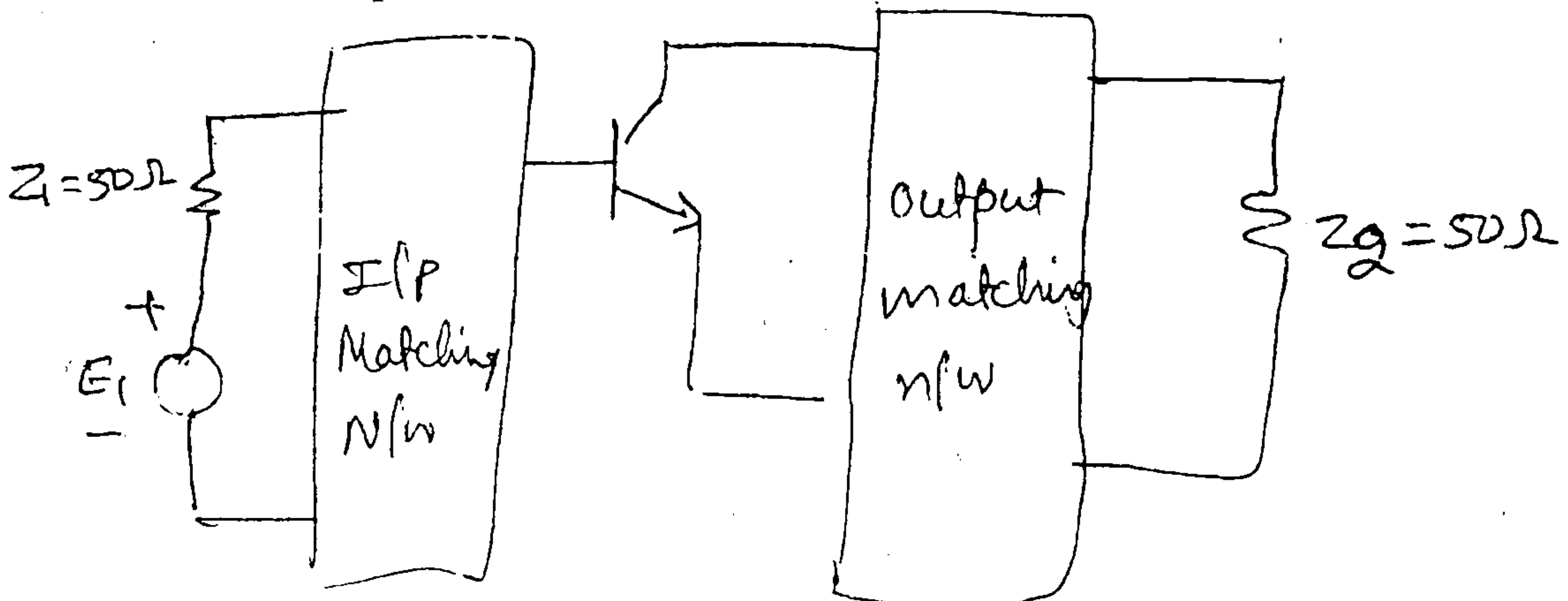
7. (a) A GaAs FET is biased for minimum noise figure and has following S parameters and noise parameters at 4 GHz ($Z_0 = 50 \Omega$). 15

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

$F_{min} = 1.6 \text{ dB}$ $\Gamma_{opt} = 0.62 \angle 100$ $R_N = 20 \Omega$.

Design an amplifier with 2 dB noise figure and maximum gain compatible with this noise figure. Assume device is unilateral

- (b) Consider the amplifier circuit shown below : 5



The input and output matching networks are to be designed using open circuited stubs for $\Gamma_s = 0.5 \angle 120$ and $\Gamma_L = 0.4 \angle 90$. Use Smith Chart.

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Sub - EL-II I.P.

QP Code : MV-19153

(3 Hours)

[Total Marks : 100

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Q1. Is compulsory

Solve any 4 from remaining

Q1 A. State and explain significance of convolution property of 2D Fourier Transform (5 marks)

Q1 B. Justify/contradict all image compression techniques are invertible. (5 marks)

Q1 C. Lossy and lossless compression

Q1. D. Why zig-zag scanning preferred in JPEG standard? (5 marks)

Q2. A. What is Hadamard transform? Write a 4 X 4 Hadamard matrix and it's applications.
Is H(4) orthogonal? (10 marks)

Q2 B Explain segmentation based on discontinuity and segmentation based on similarities. (10 marks)

Q3. A. 8 level image is given below

(10 marks)

$F(x,y) =$

4	6	0	3	7
2	1	5	0	3
4	2	7	0	7
1	5	4	6	0
4	7	5	4	1

Prepare histogram of given image

Perform histogram equalization and draw new histogram

Q3 B. Compute 2D DFT of 4 X 4 gray scale image given below and then compute inverse 2D, DFT of transform coefficients. The image $f(x, y)$ is given by

(10 marks)

1	1	1	1
1	1	1	1
1	1	1	1
1	1	1	1

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- Q.4 A Apply Slant transform and DCT transform on the given image and compare the result.
(10 marks)

$F(x,y)=$

2	2	2	1
2	4	4	2
2	4	4	2
2	2	2	2

- Q4 B Explain Homomorphic filter. (10 marks)

- Q5 A Write notes on Hotelling transform. (10 marks)

- Q5 B. Calculate entropy and coding redundancy for symbols given in table using Huffman codes.
(10 marks)

Symbol	a1	a2	a3	a4	a5	a6	a7	a8
Probability	0.1	0.4	0.05	0.05	0.1	0.2	0.07	0.03

- Q6 A Explain image enhancement in frequency domain. (10 marks)

- Q6 B Explain JPEG 2000 image compression standard. (10 marks)

- Q7 Write notes on (20 marks)

1. Connectivity of pixels
2. Image restoration.
3. Wiener filter.

BE EXTc Q. sem VIII (Rev) 22/M-2013
Sub - EL-II ~~IP~~, TNM

QP Code : MV-19147

(3 Hours)

[Total Marks : 100

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

(2) Attempt any four questions from remaining questions.

(3) Make suitable assumptions wherever necessary and clearly justify them.

1. (a) What is Remote Monitoring ? Explain RMON1 MIB. 5
(b) State the goals of network management. 5
(c) Explain SNMPv1 PDU format. 5
(d) State the services offered by CMISE. 5
2. (a) Compare different network management standards with their key features. 10
(b) Describe OSI network management model. 10
3. With respect to network management, explain following in detail :-
 - (a) Manager 2
 - (b) Management agent 2
 - (c) MIB 4
 - (d) SMI 4
 - (e) ASN.1 4
 - (f) BER. 4
4. (a) Describe TMN conceptual model. 10
(b) List and explain SNMPv2 commands. 10
5. (a) State the additional capabilities of RMON2 over RMON1 and explain how these capabilities can be used for an enterprise network management. 10
(b) Describe the SNMPv3 user-based security model. 10
6. (a) Explain the functional requirements of NMS design. 10
(b) Explain the five types of applications defined by SNMPv3. 10
7. Write short notes on (any two) :- 20
 - (a) ATM reference model defined by ATM Forum.
 - (b) Comparison between SNMP and CMIS/CMIP.
 - (c) SNMP proxy server.

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OFC

QP Code :MV-19218

(3 Hours)

[Total Marks : 100

- N. B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions from remaining six questions.
(3) Assume suitable data whenever necessary and justify the same.

1. (a) Compare dark current with optical current semiconductor. 5
(b) Explain direct and Indirect band gap semiconductor. 5
(c) What do you mean by optical waveguide? How it is different from Electrical waveguide? 5
(d) Explain Bandwidth distance product. 5
2. (a) Derive the expression for Numerical Aperture of a step-index fiber. What will happen to Numerical Aperture if cladding is removed? 5
(b) Compare step index and graded index fiber. 5
(c) What do you understand by intramodal dispersion? Derive the expression for material dispersion. 10
3. (a) Explain the significance of V-number. Derive the expression for number of guided modes in graded index fiber. 10
(b) Explain following terms: 5
(i) Total internal reflection
(ii) Acceptance angle
(iii) Critical angle
(iv) Quantum efficiency
(v) Responsivity
(c) State the difference between LED and LASER. 5
4. (a) Explain Modified Chemical Vapour Deposition (MCVD) method of fiber fabrication? 10
(b) Explain with neat sketches fiber splicing techniques. Enlist the desirable requirements of a good connector. 10
5. (a) A photodiode has a quantum efficiency of 65% when a photon of energy of 1.5×10^{-19} J are incident upon it. 10
(i) At what wavelength is the photodiode operating.
(ii) Calculate the incident optical power required to obtain photo current of 2.5 μ A when the photodiode is operating as above.

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- (b) Explain the various factors responsible for optical signal attenuation and dispersion. **10**
6. (a) With the help of receiver configuration circuit diagram, explain the working of optical receiver. Also derive the expression for output. **10**
- (b) Explain all aspects of link power budget. **10**
8. Write short notes on: (any four) **20**
- (i) Linearly polarized modes
 - (ii) OTDR
 - (iii) WDM
 - (iv) Compare PIN and APD diode
 - (v) Optical amplifiers
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QP Code : **MV-19390**

(3 Hours)

[Total Marks : 100

- N.B. : (1) Question no. 1 is compulsory.
(2) Answer any four questions from remaining six questions.
(3) Assume suitable data if necessary, with justification.

1. (a) Explain RAKE receiver in CDMA. 5
(b) Explain various states in Bluetooth. 5
(c) What is the 'hidden' and 'exposed' node in WLAN? 5
(d) What are wireless sensor network? 5
2. (a) Explain the forward link features in CDMA 2000. 10
(b) Give technical differences between CDMA 2000 and WCDMA with respect to the core network, channel bandwidth, chip rate, Modulation, mode of operation, source identification codes for sector and mobile, channel coding and overhead. 10
3. (a) Explain link budget analysis and requirements of wireless networks. 10
(b) Explain back-off algorithm. Why is CSMA-CD not used in WLAN? 10
4. (a) Explain the following : 10
(i) Bluetooth protocol stack
(ii) Bluetooth security aspects.
(b) The IEEE 802.11 WLAN uses a 64 sub channel implementation of multicarrier modulation (OFDM). 48 subcarriers are used for information transmission, 4 subcarriers for pilot tones are used for synchronization and 12 are reserved. Each sub channel has a symbol rate of 250 kilo symbols per second. The occupied bandwidth is 20 MHz. Find the bandwidth of a subchannel. What is modulation efficiency? What is a user symbol rate? If 16-QAM modulation is used, what is the user data rate if the information bits are encoded with a rate of 3/4? If the guard time between two transmitted symbols is 800 ms, what is the time utilization efficiency of the system? 10
5. (a) Explain WAP architecture in detail. 10
(b) Draw a neat block diagram for UMTS architecture. Explain all the interfaces. 10
6. (a) Explain HSDPA, emphasizing its primary objectives and how it achieves performance improvements. 10
(b) Describe the model of wireless sensor networks. What are the factor influencing design of a wireless sensor network? 10
7. Write short notes on any two :- 20
(a) Zigbee Technology
(b) UWB Technology
(c) IEEE 802.16 standard.