ME / EXTC / II 25/5/12
Advanced Digital Communication

V-A4-Ex-I-12-F-92

Con. 3812-12. **BB-3167**

(REVISED COURSE)

(3 Hours) **[Total Marks : 100**

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

1. (a) What is vector quantization. **20**
(b) Explain Miller Code.
(c) Explain the advantages of Continuous Phase modulation.
(d) Compare slow frequency hopping and fast frequency hopping.

2. (a) Explain LZW encoding and Decoding with the help of an example. **10**
(b) Explain Viterbi algorithm for MLSE of the information sequence. **10**

3. (a) Describe the basic concept of ISI. State and prove Nyquist theorem for band limited signals. **10**
(b) Define modified Duobinary encoder. Derive and sketch the spectrum and impulse response. State the advantages of modified duobinary encoder. **10**

4. (a) Sketch the phase tree, the state trellis and the state diagram for partial response CPM with $h = 1/2$ and **10**

$$u(t) = 1/4T \quad (0 \leq t \leq 2T)$$
$$= 0 \quad \text{otherwise}$$

(b) MSK is a special form of binary CPFSK with modulation index $h = 0.5$. MSK is staggered QPSK. Justify both the statements by deriving the expression for MSK. **10**

5. (a) Explain with diagram Linear Adaptive equalizer based on MSE criterion. **10**
(b) Explain Decision Feedback Equalizers with its Performance Characteristics. **10**

6. (a) Explain the necessity of PN sequence in Spread spectrum system. Design a PN sequence generator with period 15. Show the generated sequence. **10**
(b) Describe in detail process of model based source coding. **10**

7. Write short notes on :— **20**
(a) Markov Chain
(b) Kalman Algorithm.

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ME / EXTC / II (CR) 16/5/12
MDAD

mk.H.1stHlf12.15

Con. 3799-12.

BB-3162

(3 Hours) **[Total Marks : 100**

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable data** wherever **necessary**.
(4) **Figures** to the **right** indicate **maximum** marks.

1. (a) What is an unilateral figure of merit of an amplifier ? 5
(b) Explain in brief working of Quarter Wave Transformer. 5
(c) Explain briefly the DC Biasing N/ws. 5
(d) What are two port N/ws ? 5

2. (a) How many types of two port N/ws are there, convert the h-parameters of two port n/w into Z, Y and ABCD N/ws. 14
(b) Find the [ABCD] matrix for a lossless transmission line of lengths (l) and characteristic impedance (z_0). 6

3. (a) Find the s-parameters of a transmission line and prove that its s-matrix is symmetrical as well as reciprocal. 10
(b) Explain with neat diagram operation of IMPATT Diode. 5
(c) Compare Lumped elements with distributed elements. 5

4. (a) Explain the following in case of Gunn effect devices :—
(i) Domain formation 5
(ii) Operating modes. 5
(b) Explain the importance of signal flow graph for a microwave circuit. Define the Mason's rules for evaluating a signal flow graph. 10

5. (a) The S-parameters of a BJT at V_{CE} = 15 V and I_C = 15 mA at 500 MHz, 1 GHz, 2 GHz and 4 GHz are as follows :— 15

f (GHz)	S_{11}	S_{12}	S_{21}	S_{22}
0·5	0·761 | –151°	0·025 | 31°	11·84 | 102°	0·429 | –35°
1	0·770 | –166°	0·029 | 35°	6·11 | 89°	0·365 | –34°
2	0·760 | –174°	0·040 | 44°	3·06 | 74°	0·364 | –43°
4	0·756 | –179°	0·064 | 48°	1·53 | 53°	0·423 | –66°

Determine the stability. If the transistor is potentially unstable at a given frequency, draw the input and output stability circles.
(b) What is the stability criteria of an amplifier ? 5

6. (a) Explain the conditons of oscillation. Derive the conditions for stable and sustainable oscillations in one and two port negative resistance oscillators. 12

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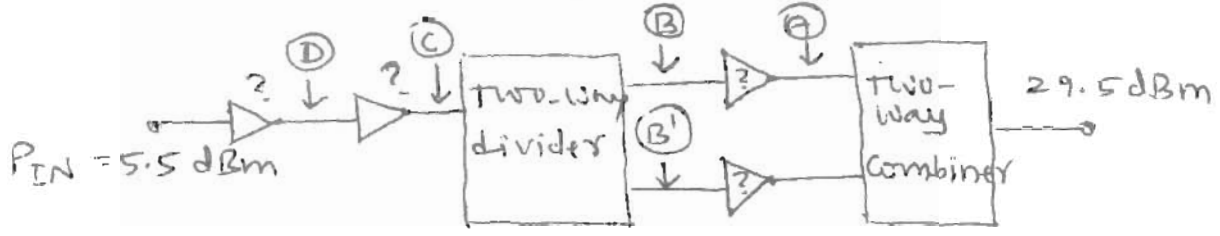
(b) Consider two power BJT amplifiers used in a circuit configuration shown below having the following specifications :— 8

Amplifier	G_0(dB)	$G_{1\,dB}$(dB)	$P_{1\,dB}$(dB m)
Amp 1	8	7	27
Amp 2	10	9	22



Assume the operating frequency is 1 GHz and the input power 5·5 dBm, specify the correct BJT amplifiers that must be used in each stage to obtain 29·5 dBm output power. Assume that each two-way divider/combiner has 0·5 dB insertion loss.

7. Write short note on the following (any **four**) :—
   (a) Measurement of noise in a transistor 5
   (b) TRAPATT Diode 5
   (c) Noise in two port network 5
   (d) RWH mechanism 5
   (e) Stub matching. 5

ME | EXTC | II 30|5|2012
Mobile Communication Systems.

VT-F.H.Exam. April.-12-64

Con. 3134–12. BB–3170

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Answer any **four** out of remaining **six** questions.
(3) Assumptions made should be **clearly** stated.
(4) Assume **suitable** data wherever **required** and justify **same**.
(5) **Figures** to **right** indicates **full** marks.
(6) Illustrate answer with **sketches** wherever **required**.

1. (a) Compare various low power wireless communication system. 5
   (b) Explain various system parameter and characteristics of GSM System. 5
   (c) Explain UPT concepts and service aspects. 5
   (d) Explain TETRA network security and its management. 5

2. (a) Explain the Radio aspects and network aspects of IMT 2000. 10
   (b) Draw and explain network layer protocol overview of TETRA. 10

3. (a) Give the details of services, configurations and standards of PMR. 10
   (b) Compare TETRA with GSM. 10

4. Explain the overview of TETRA System. 20

5. (a) Access security requirements for UPT and UMTS. 10
   (b) Intelligent cell concept and Applications. 10

6. (a) Compare various digital cellular mobile systems. 10
   (b) Explain subscriber access and pheripheral equipment interface of TETRA. 10

7. Write short notes on following :– 20
   (a) Inter system signalling of TETRA
   (b) Mobile to base link entity of TETRA
   (c) Routing and billing ascepts of UPT
   (d) PMR user community.

ME | EXTC | II (Rev) 21/5/2012
Satellite communication system

SA 1st half 87

Con. 3417-12. **BB-3164**

(3 Hours) **[Total Marks : 100**

N.B. : (1) Question **No. 1** is **compulsory.**
(2) Answer any **four** out of remaining **six** questions.
(3) Assume any **suitable** data whenever **required** but justify the **same.**
(4) **Figures** to the **right** indicate **full** marks.

1. Answer the following: 20
(a) Explain what do you mean by 'Launch Window'?
(b) Explain what is meant by AM/PM conversion and how unwanted AM is removed in satellite receiver.
(c) Explain various satellite services and the frequency band used for it.
(d) Compare FDMA, TDMA, and CDMA multiple access techniques.

2. (a) Explain (i) Thermal noise, (ii) Antenna noise temperature, and (iii) System noise temperature. 10
(b) Explain with block diagram centralized and de-centralized power supply. Give their advantages and disadvantages. Compare the performance of Nickel-Cadmium, Nickel-Hydrogen, and Silver-Zink battery. 10

3. (a) Explain in detail the operation of the SPADE for demand assignment. What is the function of common signaling channel? 10
(b) Why does a satellite's orbit deviate from the predictions of Kepler's laws? Outline the principle of sun-synchronous and Molnya orbits. What is the effect of non-spherical earth on Keplerian orbit? 10

4. (a) What are the various types of repeaters used in satellite communication? Explain any one in detail. 08
(b) Five earth stations share one transponder of a 6/4 GHz satellite. The satellite and earth station characteristics are given below: 12

Satellite:
Transponder bandwidth: 36 MHz
Transponder gain: 90 dB (max.)
Input noise temperature: 550 K
Output power: 6.3 w (max.)
4 GHz antenna gain: 20 dB
6 GHz antenna gain: 22 dB

Earth station:
4 GHz antenna gain: 60.0 dB
6 GHz antenna gain: 61.3 dB
Receiver system temperature: 100 K

Path loss:
At 4 GHz: 196 dB
At 6 GHz: 200 dB

Find the earth station transmitted power and received CNR when the system is operated:
(i) In TDMA with the transponder saturated by each earth station in turn.
(ii) In FDMA with 5 dB input and output back-off.

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5. The INTELSAT V 14 GHz West spot transponder receiver has a G/T of 3.3 dBk^{-1} and a saturation flux density of -80.3 dBw/m2. The 11 GHz transmitter part of this transponder has a saturated EIRP of 44.4 dBw. The transponder bandwidth is 72 MHz, centered at 14205 MHz up and 11155 MHz down. The satellite is used to set up a 72 MHz bandwidth link between two earth stations (ES). Assume that both uplink and downlink path lengths are 40000 km. Both transmitter and receiver antennas are 4 m diameter dishes, and the receiving ES has an overall noise temperature (including the antenna noise temperature) of 120 k. Both antennas have aperture efficiency of 60%. The link operates with a 4 dB back-off on satellite input and on satellite output. Determine the following:

(a) The uplink EIRP and uplink transmitted output power in watts and dBw. 05
(b) The uplink C/N R in dB. 05
(c) The downlink C/N R in dB. 05
(d) The overall C/N R. 05

6a) A hypothetical satellite network requires participating stations to have a minimum G/T 1
given by:

$$G/T = 40.7 + 20 \log_{10}(f/4)\ dBk^{-1}$$

where the values used for frequency f is in GHz. Assume operation at 4 GHz with a terminal consisting of an antenna followed by waveguide (physical temperature 300 K) with 0.6 dB loss and a parametric amplifier with 1.0 dB US standard noise figure and 15 dB gain. The parametric amplifier drives a mixer –preamplifier with a 7 dB noise figure and 30 dB gain. After the mixer-preamplifier is an IF receiver with a 12 dB noise figure. Calculate the antenna diameter in meters necessary to meet the G/T specifications. Assume that the antenna noise temperature is 15 K independent of diameter and that the aperture efficiency is 65%.

(b) Derive the equation for the combined uplink and downlink C/N ratio. In a certain satellite communication link the uplink C/N is 22 dB and the downlink C/N is 18 dB. Find the overall C/N. 08

7. Write notes on any four of the following: 20
a) VSAT network
b) SDMA
c) Satellite Earth station
d) Satellite subsystems
e) Satellite reliability and space qualification.

ME | EXTC | II 4/6/12
Data Compression methods

115-p3-d-upq-FH KL12 B

Con. 4592-12. BB–3176

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** of the remaining **six** questions.

1. (a) Discuss the need for data compression. **5**
   (b) What are the various models considered for compression and how are they useful ? **5**
   (c) Discuss the applications of Run Length Encoding Method. **5**
   (d) What is a static dictionary encoding method and where is it used ? **5**

2. (a) Explain the Adaptive Huffman coding process for the string 'abcabd.....'. Also give the encoding and decoding process for the same. **10**
   (b) Distinguish between scalar and vector quantization. Explain K-Means algorithm. **10**

3. (a) For the given probability model decode a sequence of length 10 with a tag of 0·63215699.
   $P(q_1) = 0{\cdot}2$, $P(q_2) = 0{\cdot}3$ and $P(q_3) = 0{\cdot}5$. Use arithmetic coding. **10**
   (b) Give a suitable scheme for speech compression. Discuss the MPEG audio, encoder and decoder system. **10**

4. (a) Given an initial dictionary of letters **m,n,o,p,q**. Encode using LZW algorithm 'mnomnpoqmonpoqmno'. **10**
   (b) Describe various approaches to image compression and discuss one of them in detail. **10**

5. (a) What is progressive image transmission ? And how is it useful ? **10**
   (b) Discuss the advantages of Transform Coding. Which of the transforms is considered most efficient for compression and why ? **10**

6. (a) What are the different methods for speech synthesis ? Discuss LPC–10 in detail. **10**
   (b) Discuss the various MPEG standards for video; giving their salient features. **10**

7. Write notes on (any **two**) :— **20**
   (a) Fascimile Coding
   (b) Packet Video
   (c) JPEG 2000
   (d) Fractal Image Compression.
