

ME EXTC II (REV)
Satellite Communication System.

P4-Exam.-May-11-152

Con. 3001-11.

BB-4368

[Total Marks : 100

(3 Hours)

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

(2) Solve any **four** questions from remaining.

(3) Assume **suitable** additional data whenever **necessary**.

1. (a) Compare different characteristics of Categories, High Power, Low Power and Medium Power systems to provide DBS System. **20**
- (b) What is 'Launch Window' ? Explain.
- (c) Explain why there is only one geostationary orbit. The further away from equator a launching site is the less useful it is, justify this statement.
- (d) Explain what is meant by (i) line of upsides and (ii) line of nodes. Is it possible for these two lines to be coincident ?

2. (a) Explain what is meant by the earth eclipse of an earth-orbiting satellite. **4**
Why is it preferable to operate with a satellite positioned west, rather than east, of earth station longitude ? **2**
Explain briefly what is meant by sun transit outage. **4**
- (b) With the help of block diagram explain telemetry, tracking and command system in satellite communication systems. **10**

3. (a) What are various types of repeaters used in satellite communication ? Explain any one in details. **10**
- (b) Define and explain the term 1-dB compression point. What is the significance of this point in relation to the operating point of a TWT ? Explain why operation near saturation point of a TWTA is to be avoided when multiple carriers are being amplified simultaneously. **10**

4. (a) With the aid of a block schematic describe the functioning of a transmit receive earth station used for telephone traffic. Describe a multidestination carrier. **10**
- (b) Describe the principles of operation of a speech predictive encoded communication (SPEC) system, and state how this compares with digital speech interpolation. **10**

5. (a) An FM/TV carrier is specified as having a modulation index of 2.571 and a top modulating frequency of 4.2 MHz. Calculate the protection ratio required to give a quality impairment factor of (i) 4.2 and (ii) 4.5. 5
- (b) Derive an expression for 'Saturation flux density'. 5
- (c) Explain with diagram – 10
- (i) Lens Antennas (ii) Array Antennas and their advantages.
6. Write short notes (any four) :- 20
- (a) VSAT network and their applications
- (b) Orbital Perturbations
- (c) Space-division multiple access (SDMA)
- (d) Station Keeping
- (e) 'Sun Shielding Technique' to satellite.
7. (a) Explain synchronization of TDMA system. What is Frame efficiency? 10
- (b) (i) Inclination for Russian Molniya orbit is equal to 63.45° . Why? 10
- (ii) For polar orbit, rate of regression is zero. Why?
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Con. 3812-11.

BB-4365

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is compulsory.
 (2) Attempt any four from remaining six questions.
 (3) Figures to the right indicate marks.

1. (a) Realize 15 nH using a transmission line section with $Z_0 = 50 \Omega$ at 1 GHz. 5
 (b) Derive ABCD matrix of a series 'z' element. 5
 (c) What is an Unilateral figure of merit of an amplifier? 5
 (d) What is a noise figure? Distinguish between Thermal Noise and Shot Noise. 5

2. If the transfer matrix of a network is :— 15

$$\begin{bmatrix} A & B \\ C & D \end{bmatrix} = \begin{bmatrix} 0.35 & j16 \\ j1.6 & 0.5 \end{bmatrix}$$

Determine s matrix assuming 50Ω impedance.
 Find out the condition of reciprocity for this network. 5

3. (a) Derive following parameters of an amplifier :— 10
 - (i) Power Gain (G)
 - (ii) Available Gain (GA)
 - (iii) Transducer Gain (GT).
- (b) Explain Ridley-Watkins-Hilsum mechanism of Gunn-diode. 10

4. What is the stability criteria of an Amplifier? 5
 If the transistor has following s-parameters at 5GHz with 50Ω impedance 15

$$S_{11} = 0.6 \angle -175^\circ, \quad S_{12} = 0.02 \angle 20^\circ,$$

$$S_{21} = 2.2 \angle 35^\circ, \quad S_{22} = 0.6 \angle -95^\circ.$$

Determine the stability criteria and plot the stability circles.

5. (a) Discuss the working principles of Avalanche and Transferred electronic devices. 10
 (b) Match using a single stub a load impedance of $75 - j 100 \Omega$, which terminates a 50Ω line. 10

6. Design an amplifier for maximum gain at 2GHz with 50Ω . The S-parameters are :— 20

$$S_{11} = 0.75 \angle -120^\circ, \quad S_{12} = 0$$

$$S_{21} = 2.5 \angle 80^\circ, \quad S_{22} = 0.6 \angle -70^\circ.$$

7. (a) Explain using suitable diagrams two methods of designing broad band amplifier. 10
 (b) Explain the condition of oscillation. Discuss the functioning of Hartley and Colpitt oscillators. 10

15/6/2011

M.E EXTC II (Rev)
Elective II - Simulation of Communication Systems
BB-4383

121-mk: 1stHf-11.

Con. 3389-11.

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) **Figures** to the **right** indicate **full** marks.
(4) **Assumptions** should be **clearly** stated.

1. (a) Explain Poisson arrival pattern in detail. 7
(b) Describe in brief the estimation of parameters in simulation. 7
(c) What do you mean by Monte Carlo simulation ? 6
 2. (a) Describe the features of GPSS simulation language and list the merits and demerits. 10
(b) Describe the important features of Object oriented simulation. 10
 3. (a) What is list processing in simulation ? Explain linked storage in detail. 10
(b) Implement a differential encoder for the case of $M = 16$ DPSK. Perform Monte Carlo simulation. 10
 4. (a) Explain discrete event simulation. Explain in detail Time Advance Mechanism. 10
(b) Draw a block diagram of an adaptive equalizer that adapts its tap coefficients based on the MSE criterion. Explain why it is called Stochastic gradient algorithm. 10
 5. (a) Explain in detail modelling and simulation of continuous linear and non-linear systems. 10
(b) Explain verification and validation of simulation models. 10
 6. (a) Explain in detail the synchronizaiton of communication system. 10
(b) Explain the process involved in Non-uniform continuously distributed random numbers. 10
 7. Write a short note on (any three) :— 20
 - (a) Source and error control coding
 - (b) Error probabilities in Digital Systems
 - (c) SIM SCRIPT
 - (d) Random Process and Random Variables.
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Con. 3388-11.

(REVISED COURSE)

BB-4372

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Attempt any four questions out of remaining six questions.
 (3) Figures to the right indicate full marks.

1. Write short notes on : (20)
 - a) Kraft inequality.
 - b) Linear Modulation with memory
 - c) The Nyquist criterion for band limited channels
 - d) Kalman Algorithm.

2. a) Compare source coding with channel coding. Explain spectral waveform coding. (10)
 b) The output of a DMS consists of letters x_1, x_2, x_3 with probabilities 0.45, 0.35 and 0.20 respectively. Find out the efficiency using Huffman code. If pairs of symbols are encoded using Huffman code, Find out the efficiency. Comment on your result. (10)

3. a) Derive the power spectral density of QPSK and plot the same. Also compare Offset QPSK with Non offset QPSK. (10)
 b) What is Continuous phase modulation system (CPM)? Draw the phase trajectory for binary CPFSK. (10)

4. a) Describe maximum likelihood sequence detection for controlled ISI. (10)
 b) Explain the concept of transition probabilities, transition matrix and transition diagram in Markov chain process. (10)

5. a) For linear equalizers, prove that $SNR = \frac{1 - J_{\min}}{J_{\min}}$ under MSE criterion. (10).
 b) What are adaptive equalizers? With neat block diagram, explain the working of adaptive equalizers using LMS algorithm. (10)

6. a) Compare slow frequency hopping with fast frequency hopping. Draw the hopping patterns of both the cases. (08)
 b) Explain Synchronization in FHSS technique with neat diagram. (08)
 c) Define processing gain and Jamming margin in spread spectrum techniques. (04)

7. Discuss any two in detail : (20)
 - a) Decision Feedback equalizers.
 - b) Power Spectra of linearly modulated signals
 - c) QAM and associated power constraints.

15/6/2011

M.E EXTC II (Rev)
Elective II - Data Compression
Methods
BB-4380

42 : 1st half.11-AM(n)

Con. 3609-11.

(3 Hours)

[Total Marks : 100

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

1. (a) What are the various types of models used for Data Compression ? 5
(b) What are the various differential Encoding schemes used for speech compression ? 5
(c) Explain the main features of Code Excited Linear Prediction (CELP). 5
(d) Give the essential aspects of Progressive Image Transmission. 5
2. (a) Generate a ternary Huffman Code for a source with a six-letter alphabet and a probability model $P(a_1) = P(a_3) = P(a_4) = 0.2$, $P(a_5) = 0.25$, $P(a_6) = 0.1$ and $P(a_2) = 0.05$. Also calculate the average length of the code, its redundancy and draw the code tree. 10
(b) How is the updating procedure done in the Adaptive Huffman Code. Give an example. 10
3. (a) For an alphabet $A = \{a_1, a_2, a_3\}$ with probabilities of 0.1, 0.2 and 0.7 respectively, generate a real value tag and decipher it for the sequence 'a₁ a₁ a₃ a₂ a₃ a₁'. 10
(b) List the various applications where RLE can be used and explain one of them in detail. 10
4. (a) What are Static Dictionaries ? Give their applications and limitations. 10
(b) Using LZ 78, encode the following string. 'ellohellohellohellohello'. 10
5. (a) How is the Human Auditory System utilized for effective speech compression. 10
(b) How is Transform Coding used in Image and Audio compression. 10
6. (a) Give the main features of Fractal Image Compression. 10
(b) Discuss 'Motion Compensation' with respect to video compression. 10
7. Write notes on any **two** of the following :— 20
 - (a) Packet Video
 - (b) JPEG
 - (c) Vector Quantization
 - (d) LBG Algorithm.

10/6/2011

AGJ 1st half (n) 20

M.E EXTC II (Rev)
Mobile Communication System

BB-4374

Con. 3331-11.

(3 Hours)

[Total Marks : 100

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

(2) Attempt any **four** questions out of remaining **six** questions.

Question no. 1. Explain the followings:

- A) Logical channels in GSM system (05)
- B) 'Soft Handoff' with reference to IS-95 (05)
- C) Voice Coding in TETRA system (05)
- D) Cell sectoring and its advantages (05)

Questions no. 2.

- A) Explain the reference architecture of GSM with the help of block diagram. (10)
- B) Write about the radio aspects of CT-2 systems. (10)

Questions no. 3.

- A) Write about the radio aspects, transmission modes, spectrum efficiency and spectrum sharing in IMT-2000 standard. Explain how interfaces of IMT-2000 provide seamless global roaming. (10)
- B) Compare and contrast Private Mobile Radio and Cellular systems. (10)

Questions no. 4.

- A) List and explain various PMR configurations in detail. (10)
- B) Compare and contrast GSM and Tetra systems. (10)

Questions no. 5.

- A) Describe TETRA system architecture and its components. (10)
- B) Explain authentication procedure in TETRA systems. (10)

Questions no. 6. Write short notes on:

- A) UPT concepts and its service aspects (10)
- B) The concept of intelligent cell and its applications (10)

Questions no. 7.

- A) List and describe in brief about various teleservices and supplementary services provided by TETRA system. (10)
- B) Describe TETRA CIRCUIT MODE (V+D) operation in detail. (10)