Code No: 07A7EC18 | **R07** | | **Set No. 2** |

IV B.Tech I Semester Examinations,MAY 2011
SATELLITE COMMUNICATIONS
Common to Electronics And Telematics, Electronics And Communication
Engineering

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the function of each element of a Satellite Communication Network.   [16]

2. (a) What is meant by Earth station? How it is categorized? And What is the fundamental parameter used to describe Earth station?

   (b) On what factors the design of Earth station depends explain?   [8+8]

3. (a) What do you mean by space qualification? Explain.

   (b) What do you mean by reliability and redundancy? How reliability increases through redundancy?   [8+8]

4. (a) Define Noise temperature. How it is used to calculate noise power and derive an equation for C/N ratio for the antenna delivering a power to the receiver with a IF gain (G) of the receiver.

   (b) A Satellite at a distance of 36000Km from earth radiates a power of 10W from an antenna with a gain of 20 dB. Find the power received by an earth station antenna with a gain of 45 dB operating frequency is 11GHz.   [8+8]

5. Write about the satellite signal Acquisition?   [16]

6. What is meant by TDMA frame acquisition and frame synchronization? What is frame delay? How does it help in carrying out TDMA frame acquisition and frame synchronization techniques?   [16]

7. Explain the network issues in NGOSS.   [16]

8. (a) Derive expressions for umbra and penumbra angles and show that the optimum eclipse duration is about 1 hour and 10 minutes.

   (b) Show that the period of revolution of a geostationary satellite is approximately 24 hours.   [12+4]

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Code No: **07A7EC18** | **R07** | **Set No. 4**

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Common to Electronics And Telematics, Electronics And Communication Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. Discuss the future trends of Satellite Communication. [16]

2. (a) Discuss onboard processing transponder in brief.

   (b) Write short notes on "Horn Antennas."

3. (a) A Satellite is moving in a near earth circular orbit at a distance of 640Km. Determine its orbital period.

   (b) A Satellite is moving in a molniya orbit having the farthest and the closet points as 35000 Km and 500 Km respectively from the earth's surface. Determine the time period and the velocity at the apogee and perigee points.

   [8+8]

4. Explain the terminal characteristics and common requirements of NGOSS. [16]

5. (a) Illustrate the DS-SSCDMA with seven chip spread code sequence 1110100.

   (b) Show a base band correlator for discrete spread CDMA system? [12+4]

6. (a) Describe the various function to be carried out by satellite launching earth station when launching the satellite.

   (b) Explain the operation on deriving mechanism of Antenna employed in the earth station. [8+8]

7. (a) What is meant by wide area augmentation system WAAS?

   (b) What is the need of local area augmentation system using DGPS? [8+8]

8. (a) Suppose we have a 4 GHz receiver with the following gains and noise temperature T_{in}=30K, T_{RF}=30K, T_m=500K, T_{IF}=1500K, G_{RF}=20dB, G_m=10 dB, G_{IF}=40 dB. Calculate the system noise temperature.

   (b) If in the above problem, a section of loss wave guide is inserted between antenna and RF amplifier. Find the new system noise temperature.

   (c) By what range, the insertion of the lossy waveguide increases the overall system noise temperature measured at the CUA input. What will be the carrier to noise ratio. [6+5+5]

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Code No: 07A7EC18   **R07**   **Set No. 1**

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Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
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1. (a) Explain the effect of Solar Eclipse on the performance of Geostationary Satellite.

   (b) Describe the steps involved in launching a Satellite.   [8+8]

2. (a) What is the necessity of Satellite for Communication. Explain.

   (b) Discuss the three types of Satellite Systems.   [8+8]

3. (a) Explain the two van Allen radiation belts.

   (b) Explain two main aspects of radiation.   [8+8]

4. (a) Define Bits, Symbols and channels in TDMA.

   (b) Explain TDMA frame structure.   [3+13]

5. What are the main considerations in the design of the earth station? With the help of block diagram, discuss the operation of atypical large earth Station. How this configuration is is different from that of very small aperture techniques? State reasons for this difference?   [16]

6. (a) Explain the trilateration method used for position of GPS receiver.

   (b) What is meant by p-code in GPS satellite?   [8+8]

7. (a) Mention the Main Characteristics of a parabolic reflection that make it highly suitable for use as antenna reflector.

   (b) Explain why some satellite employ cylindrical solar arrays where as other employ solar cell arrays for the primary power ,monitoring the typical power output from each type.   [8+8]

8. (a) Explain the calculation of the noise power budget for an Intel Sat IV-A satellite link.

   (b) A Satellite transmits FMTV in a 36 MHz bandwidth with a 34 dBw carrier EIRP. Assuming a 40,000 Km path length and a center frequency of 3.7 GHz. Determine the C/N in dB if the antenna noise temperature is 90^0 K.   [8+8]

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Code No: 07A7EC18 | **R07** | **Set No. 3**

IV B.Tech I Semester Examinations,MAY 2011
SATELLITE COMMUNICATIONS
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Time: 3 hours | Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. In Earth station explain:

   (a) Low-noise amplifier

   (b) High power amplifier and mention advantages and disadvantages and applications. [16]

2. Explain about the functions of DGPS. [16]

3. Name the Orbital aspects which are of importance in Synchronous Satellite Communication. Explain these aspects. [16]

4. (a) Explain the general aspects of coverage and frequency considerations of low earth orbit.

   (b) Why L-band is allocated for mobile satellite service? [8+8]

5. (a) Draw a neat diagram of Telemetry, Tracking and command and explain the operation.

   (b) What is Transponder? How many transponders are provided in a satellite link and discuss about the frequencies used in these transponders. [8+8]

6. Explain the function of each element of a Mobile Satellite service(MSS). [16]

7. (a) Discuss the link budget of down link.

   (b) Design a Ku band receiving earth station to provide an overall clear air C/N of 17 dB in a 27 MHz, IF noise bandwidth at carrier frequency of 11.45GHz. The antenna noise temperature is 30K and the LNA noise temperature is 110k .Assume a high gain LNA and ignore the noise generator in the other parts of the receiving antenna. The receiving terminal is located on the 3dB contour of the satellite foot print and clear air attenuation on the path and other losses total 0.8dB. [8+8]

8. A BPSK TDMA system is to transmit 1000 digital voice channels, each with 4 bits per sample at a 64kbps rate. The system must accommodate 1000 data bits/slot at a frame efficiency of 90%.

   (a) What is the number of slots in a frame?

   (b) What is the length of TDMA frame?

   (c) How many preamble bits can be used?

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(d) What is the required satellite bandwidth? [16]

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