Code No: 07A70405 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,December 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. (a) What is meant by differential GPS? What are its uses?
   (b) Explain the GPS TIME. [6+10]
2. (a) Discuss the noise model of receiver.
   (b) Derive the system temperature in terms of T_{in},T_{RF},T_m,T_{IF} G_{RF}, and G_m. [8+8]
3. Discuss the origin of Satellite Communications in detail. [16]
4. (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]
5. Explain the orbital consideration and constellation size of NGSO. [16]
6. (a) Explain different types of redundancy connections to complete subsystem reliability of a Satellite System.
   (b) Write short notes on "Spacecraft Subsystems." [8+8]
7. (a) Prove that the smallest value that the inclination angle can have is equal to latitude of the launch site in the plane of the orbit.
   (b) A Satellite is in circular equatorial orbit at an altitude of 10,000 Km from the Earth's surface. Determine the Maximum Eclipse time in a day during the full Eclipse period. [8+8]
8. (a) A TDMA system operates at 300 Mbits/s with a 5 ms frame time. Assume that all slots are of equal length and that a guard time of 2ms is required between slots. Compute the efficiency of the communications resource (CR) for the case of 5, 10, 50 and 100 slots per frame.
   (b) What is meant by the SPADE system? [10+6]

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Code No: 07A70405 **R07** **Set No. 4**

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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Describe the General Structure of Satellite Communication. [16]
2. (a) Define Kepler's laws of orbiting bodies and derive an equation to show that the third law is true for any orbiting satellite.
   (b) A Satellite is orbiting round the earth at 42124 Km.The earth station is looking at this satellite at an elevation angle of 35^0. Calculate the slant range. Make suitable assumptions and give reasons for making such an assumption. [8+8]
3. (a) What is meant by GPS Navigation message?
   (b) Write sub frame details of GPS navigation message. [8+8]
4. Explain in detail the losses that occur during propagation of EM wave from earth station to satellite and vice versa. In what way they help in satellite communication link design. [16]
5. (a) On what factor the electrical power requirement in satellite depends and explains the electrical power distribution in a satellite.
   (b) List out the power failure factors in satellite and how to avoid them. [8+8]
6. (a) Define Bits, Symbols and channels in TDMA.
   (b) Explain TDMA frame structure. [3+13]
7. Explain the connectivity of LEO satellites to MCS via geostationary satellite. [16]
8. Expalin the following sensors that are used to sense the altitude of a satellite:
   (a) Sun Sensor
   (b) Dual Cone Sensor
   (c) Infrared Sensor. [5+5+6]

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Code No: 07A70405 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,December 2011
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What do you understand by G/T of an earth station?
   (b) In a satellite communication system, the satellite is at height of 36,000Km above earth the frequency used is 4GHz and the transmitting antenna gain is 75 dB and the receiving antenna gain is 45 dB. Calculate:
      i. The free space transmission loss
      ii. The received power, when the transmitter power is 200watts. [8+8]
2. (a) Explain the Basic Differences between an Active and Passive Satellites.
   (b) Give Brief Idea about Mobile Satellite Communication. [8+8]
3. Discuss the phenomena of eclipse as applied to geostationary satellite and solar interference experienced at an earth station. How do these factors influence the system design. [16]
4. Illustrate the scan angle of an individual beam width within instaneous coverage. [16]
5. 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]
6. (a) What are the characteristics that are most important in satellite antenna?
   (b) Find the gain and beam width of an antenna of diameter 2m operation at 14GHz. Assume an aperture efficiency of 60%. [8+8]
7. (a) What is meant by Transit satellite?
   (b) Explain the basic requirements of a satellite navigation system. [4+12]
8. (a) Discuss the principle of N-S control of a spinner satellite using infrared sensor with a neat figure.
   (b) Draw the block diagram of typical onboard control system for a spinner satellite and explain its operation. [8+8]

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Code No: 07A70405 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,December 2011
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Give the Classification of types of Satellites. Explain them.
   (b) Discuss the present status of Satellite Systems. [8+8]
2. Explain the delay and throughput. Explain how optimum orbital altitude is determined? [16]
3. (a) Explain the small earth station.
   (b) Explain the very small Aperture terminals [VASTS]. [10+6]
4. (a) A quasi GEO Satellite is in a circular orbit close to geosynchronous altitude. The quasi GEO Satellite however does not have a period of one sidereal day its orbital period is exactly 24 hours-one solar day. Calculate:
      i. The radius of the orbit
      ii. The rate of orbit around the equator of the sub satellite point in degree Per (solar) day.
   (b) Explain any one procedure of placing the Satellite in to geostationary orbit. [8+8]
5. (a) Define a process gain? What is the signal-to-noise ratio in spread spectrum receiver.
   (b) Derive bit rate of each signal in a DS-SS CDMA.
   (c) What are the uses of CDMA? [2+12+2]
6. (a) Mention the factors on which the selection of an antenna depends. Which antenna is suitable for a satellite.
   (b) What do you mean by Relaibility, Mean time before failure, Effective failure rate as applied to a satellite subsystem and components. Explain the significance of the bath-tub curve. [8+8]
7. (a) Explain about signal processing techniques used in GPS receiver.
   (b) What are the successful measurements in a GPS C\A code receiver? [8+8]
8. (a) Discuss the uplink design.

(b) A Transponder of a Ku band satellite has linear gain of 127 dB and a nominal output power at saturation of 5W. The satellite's 14GHz receiving antenna has a gain of 26 dB on axis and the beam covers western Europe. Calculate the power output of an uplink transmitter that gives an output power of 1W from the satellite transponder at frequency of 14.45GHz. when the earth station antenna has a gain of 50 dB and there is a 1.5 dB loss in the waveguide run between the transmitter and antenna.
Assume that the atmosphere introduces a loss of 0.5dB under clear sky conditions and that the earth station is located on the -2dB contour of the satellite?s receiving antenna. If the rain in the path causes attenuation of 7 dB for 0.01% of the year. What output power rating is required for the transmitter to guarantee that a 1 W output can be obtained from the satellite transponder for 99.9% of the year if the uplink power control is used. [8+8]

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