R10

IV B.Tech II Semester Regular Examinations, April/May - 2014
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time : 3 hours   **Max. Marks: 75**

Answer any Five Questions
All Questions carry equal marks
*****

1 a) Explain about LEO and MEO satellite systems   [8]
   b) Explain the general and technical characteristics of a satellite communication
       system   [7]

2 a) Define Kepler's laws of planetary motion with relevant mathematical
       expressions   [8]
   b) An earth station has a longitude of 99.5^0 west and latitude of 29.5^0 north. The
       satellite has a longitude of 143^0 west. Find the azimuth and elevation angle.   [7]

3 a) Draw and explain the simplified double conversion transponder (bent pipe) for
       6/4 GHz band   [8]
   b) Draw a diagram to show different forces on a synchronous satellite and explain
       about attitude control system   [7]

4 a) Discuss in detail about rain effects in *ku* band   [8]
   b) An earth station antenna has a diameter of 35 m, has an overall efficiency of
       69%, and is used to receive a signal at 4350 MHz. at this frequency the system
       noise temperature is 78K when the antenna points at the satellite at an elevation
       angle of 28^0. What is the earth station G/T ratio under these conditions?   [7]

5 a) Compare and contrast pre assigned FDMA and demand assigned FDMA   [8]
   b) Discuss clearly the CDMA system with example   [7]

6 a) Illustrate the operations required for receiving a signal from the satellite using
       multicarrier earth station   [8]
   b) Illustrate the design of electromagnetic-horn radiator   [7]

7 a) What are the important factors that influence the design of any satellite
       communication system? Discuss   [8]
   b) What do you mean by Globalstar, Ellipso? Explain in detail   [7]

8 a) Draw the general arrangement of position location with GPS and explain about
       GPS in detail   [8]
   b) Draw the block diagram of C/A code generator and explain   [7]

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1 a)   Explain clearly about GEO satellite systems   [8]

    b)   Write about the future trends of satellite communications   [7]

2 a)   Derive expression for the radius of geosynchronous orbit   [8]

    b)   Write about the orbital effects in communication system performance   [7]

3 a)   What are two approaches used for equipment reliability in the event of failure of communication capacity of the satellite? Explain   [8]

    b)   Draw and explain the simplified single conversion transponder (bent pipe) for 6/4 GHz band   [7]

4 a)   Illustrate the procedure for *ku* band down link design   [7]

    b)   Consider a 4GHz receiver with the following gains and noise temperatures: T_{in}=25K, T_{RF}=50K, T_{IF}=1000K, T_m=500K, G_{RF}=23 db, G_{IF}=30db. Calculate the system noise temperature assuming that the mixer has a gain G_m=0db. Recalculate the system noise temperature when the mixer has a 10db loss.   [8]

5 a)   Discuss various modulation and multiplexing techniques used with satellite links   [8]

    b)   Draw the frame structure and explain TDMA   [7]

6 a)   Horn antennas are commonly used as primary radiators in reflector systems, Justify?   [8]

    b)   Draw the block diagram of TWTA transmitter required for multiple transmitter chains and explain.   [7]

7 a)   What are the four important factors that influence the design of any satellite communication system? Explain   [8]

    b)   Discuss in detail about Molniya and Elliptical orbits   [7]

8 a)   Discuss in detail the process of satellite signal acquisition   [8]

    b)   What are the major sources of error in GPS receiver? Discuss in detail   [7]

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Code No: **R42043**　　**R10**　　Set No. 3

IV B.Tech II Semester Regular Examinations, April/May - 2014
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time : 3 hours　　　　　　　　　　　　　　　　**Max. Marks: 75**
Answer any Five Questions
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1 a) Write an account of the evolution and growth of communication satellites [8]
  b) What are the applications of satellites? Explain [7]

2 a) What are look angles? How do you determine? Explain with the help of neat diagrams [8]
  b) What are orbital parameters required to determine a satellite's orbit? Name and explain them. [7]

3 a) The earth subtends an angle of 17^0 when viewed from geostationary orbit. What are the dimensions and gain of the horn antenna that will provide global coverage at 4 GHz. [8]
  b) Draw the bathtub curve for the probability of failure and explain clearly the concepts of equipment reliability, space qualification of communication satellites [7]

4 a) Illustrate the ku band uplink design [8]
  b) An earth station antenna has a diameter of 30 m, has an overall efficiency of 68%, and is used to receive a signal at 4150 MHz. at this frequency the system noise temperature is 79K when the antenna points at the satellite at an elevation angle of 28^0. What is the earth station G/T ratio under these conditions? [7]

5 a) What is the basic principle of a direct sequence spread spectrum system and explain [8]
  b) Explain about FDMA and draw the frequency plan for two C-band transponders using FDMA [7]

6 a) Draw the block diagram of a general earth station and explain [8]
  b) Draw and explain the receiver subsystem for multicarrier earth station [7]

7 a) Discuss in detail the delay and throughput considerations of satellite communication link [8]
  b) What are different satellite constellation designs? Explain any two of them [7]

8 a) What is the technique used to increase the accuracy of GPS measurements? Discuss in detail [8]
  b) Write short notes on GPS Receiver Operation [7]

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IV B.Tech II Semester Regular Examinations, April/May - 2014
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time : 3 hours   **Max. Marks: 75**

Answer any Five Questions
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1	a)	Draw the general structure of a satellite communications system and explain	[8]
	b)	Write about satellite frequency allocations and band spectrum	[7]
2	a)	Explain as to how a satellite is placed into geostationary orbit from earth?	[8]
	b)	What is station keeping? Explain in detail the N-S and E-W station keeping.	[7]
3	a)	Draw the typical telemetry, tracking, command, and monitoring system and explain how it is helpful in successful operation of a communication satellite	[8]
	b)	What are the four main types of antennas used in satellites? Explain any two with neat diagrams	[7]
4	a)	Write all the ten steps involved in the satellite communication link design procedure	[8]
	b)	Thermal noise in an earth station receiver results in a $(C/N)_{dn}$ ratio of 20 db. A signal is received from a bent pipe transponder with a carrier to noise ratio $(C/N)_{up}$=20db. What is the value of overall $(C/N)_0$ at the earth station? If the transponder introduces inter modulation products with (C/I) ratio of 24db. What is the overall $(C/N)_0$ ratio at the receiving earth station	[7]
5	a)	What is the first multiple access technique used in satellite communication systems? Explain in detail.	[8]
	b)	Suggest a multiple access technique that can be preferred in satellite communication link when traffic from earth station is intermittent? Discuss.	[7]
6	a)	Draw the basic geometry of reflector antenna and discuss its performance.	[8]
	b)	What is the equipment required for terrestrial interface? Explain.	[7]
7	a)	Compare different satellite low earth orbits with their advantages and disadvantages.	[8]
	b)	Discuss the coverage and frequency considerations with regard to low earth orbits.	[7]
8	a)	What is the basic requirement of GPS? Explain in detail about the position location using GPS.	[8]
	b)	Write short notes on Satellite Signal Acquisition.	[7]

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Set No. 1

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
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1 a) Explain the various applications of satellite communications.   [8]

   b) Describe the future trends of satellite communications.   [7]

2 a) List and explain the different orbital effects in satellite communication system
       performance.   [8]

   b) A satellite is in an elliptical orbit with a perigee of 1000km and an apogee of
       4000km. find the period of the orbit and eccentricity of the orbit.   [7]

3 a) Draw the block diagram of a typical altitude control system for a spinner
       satellite and explain its operation.   [8]

   b) Write short notes on equipment reliability in a satellite system.   [7]

4 a) Derive the expression for system noise temperature in a satellite receiver.   [8]

   b) A 12GHz earth station receiving system has an antenna with a noise
       temperature of 50K, a LNA with a noise temperature of 100K and a gain of
       40dB, and a mixer with a noise temperature of 1000K. Find the system noise
       temperature.   [7]

5 a) Explain the spreading and de-spreading process in CDMA with an example.   [8]

   b) Describe the basic principle of DAMA.   [7]

6 a) With the help of a neat block diagram describe the various functions of an earth
       station receiver.   [8]

   b) List the different types of high power amplifiers used at earth station? Explain
       any one.   [7]

7 a) What are the various types of low earth orbit satellites? Explain.   [8]

   b) Compare LEO and GEO satellites.   [7]

8 a) Explain the principle of a differential GPS with a neat diagram.   [8]

   b) Compare GPS and differential GPS.   [7]

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IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1	a)	Explain the brief history of Satellite communications.	[8]
	b)	List and explain the various frequency band allocations used for satellite services.	[7]
2	a)	Define elevation angle and derive the expression for it.	[8]
	b)	Write short notes on orbital perturbations.	[7]
3	a)	With the help of a neat diagram, explain the functions of TTC&M system.	[8]
	b)	Explain how housekeeping is maintained in a satellite system in the orbit.	[7]
4	a)	Derive the expression for G/T ratio of a satellite link.	[8]
	b)	The path length from an earth station to the GEO satellite is 38500km. calculate the path loss in dB for the following uplink frequencies: i) 1.6GHz ii) 6.2GHz iii) 14.2GHz iv) 30GHz	[7]
5	a)	What is intermodulation in FDMA? Describe the calculation of C/N ratio with intermodulation.	[8]
	b)	The uplink and downlink C/N of a satellite system is 30dB and 28dB respectively. If the transponder introduces intermodulation products with C/N of 24dB. Determine the overall C/N ratio.	[7]
6	a)	With the help of a neat block diagram explain the functions of earth station transmitter.	[8]
	b)	Describe the various functions of earth station tracking system.	[7]
7	a)	Explain the delay and throughput considerations of MEO satellites.	[8]
	b)	Compare GEO and MEO satellites.	[7]
8	a)	Explain the generation of GPS signals with a neat sketch.	[8]
	b)	Describe the applications of GPS.	[7]

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Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
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*****

1 a) Explain the basic principle of satellite communication system with a neat diagram. [8]
   b) List and explain the various applications of satellite communications. [7]

2 a) What are the various forces acting on the satellite in the orbit? Explain with necessary expressions. [8]
   b) A LEO satellite orbits at an altitude of 250km above the earth surface. Calculate the period of the satellite orbit, if the orbit is circular. [7]

3 a) Explain how orbit control is obtained in spinner and 3-axis stabilized satellites systems. [8]
   b) Write short notes on satellite antennas. [7]

4 a) Derive the expression for C/N ratio of a satellite link. [8]
   b) A satellite in GEO orbit is at a distance of 39000km from the earth station. The required flux density at the satellite to saturate one transponder at a frequency of 14.3GHz is –90dBW/m^2. The earth station has a transmitting antenna with a gain of 52 dB. Find the power of the earth station transponder. [7]

5 a) Explain the basic principle of FDMA and write its applications. [8]
   b) Draw the frame structure of TDMA and describe each field. [7]

6 a) What are the various types of antennas used at earth station? Explain anyone with a neat diagram. [8]
   b) Describe the different functions of antenna feed system at the earth station. [7]

7 a) What are the various NGSO constellation designs? Explain any two. [8]
   b) Describe the system design considerations of GEO satellites. [7]

8 a) What are the different segments in GPS configuration? Explain. [8]
   b) Describe the various sources of errors of a GPS signal. [7]

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Set No. 4

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Explain the functions of space segment and ground segment of a satellite system. [8]

b) What are the different frequencies used for satellite communications? Explain. [7]

2 a) Define azimuth angle and explain how it is evaluated? [8]

b) What are the different launch vehicle selection factors? Explain. [7]

3 a) Explain the operation of a 14/11 GHz transponder with a neat diagram. [8]

b) Write short notes on space qualification in a satellite system. [7]

4 a) Derive the expression for link equation. [8]

b) LEO satellites use mainly L band, with ranges varying from 1000km to 2500km. calculate the maximum and minimum path loss from earth to the satellite, in dB, for the uplink frequency of 1.6GHz and the downlink frequency of 1.5GHz. [7]

5 a) Explain the basic principle, advantages and applications of CDMA. [8]

b) Compare FDMA and TDMA. [7]

6 a) With a neat diagram explain the various functions of earth station tracking system. [8]

b) What are the different primary power test methods at the earth station? Explain. [7]

7 a) Explain the coverage and frequency considerations of GEO satellites. [8]

b) Compare LEO and MEO satellites. [7]

8 a) Explain the operation of a GPS receiver with a neat block diagram. [8]

b) Write short notes on GPS codes. [7]

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Code No: **R42043**

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Set No. 1

IV B.Tech II Semester Supplementary Examinations, April/May – 2017
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Discuss the origin of satellite communications in details.   [8]
   b) Discuss the performance characteristics of different altitude satellites.   [7]

2 a) Compare the three types of satellite orbits.   [8]
   b) What are orbital perturbations? Explain the effects of earth`s oblateness on
       orbital inclination of geosynchronous satellite.   [7]

3 a) Discuss the principle of N-S control of a spinner satellite using infrared sensor
       with a neat figure.   [8]
   b) Explain in details about tracking subsystem with neat block diagram.   [7]

4 a) Discuss about the G/T Ratio for earth station.   [8]
   b) Explain the design procedure of satellite communication link.   [7]

5 a) Explain the Time Division Multiple Access (TDMA) frame structure.   [8]
   b) Briefly explain the process of spread spectrum transmission and reception?   [7]

6 a) What is the performance of transmitter in an earth station and explain it.   [8]
   b) Explain the small earth station?   [7]

7 a) Write a short note on "Equatorial orbits" and "Elliptical orbits".   [8]
   b) Why L-band is allocated for mobile satellite service?   [7]

8 a) Write a note on P-code in GPS satellite?   [8]
   b) What are the difficulties in DGPS?   [7]

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R10

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SATELLITE COMMUNICATIONS
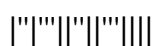### (Electronics and Communication Engineering)
Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
*****

1	a)	List the applications of satellites.	[8]
	b)	Discuss the satellite development in India.	[7]
2	a)	Discuss the procedure for launches and launch vehicles for spacecrafts.	[8]
	b)	Write notes on Orbital effects in communication systems performance.	[7]
3	a)	Discuss in detail Attitude and orbit control system for a spacecraft.	[8]
	b)	Explain the communication sub-system for the spacecraft.	[7]
4	a)	Derive the power received from the satellite at the earth station from the basic transmission theory.	[8]
	b)	Write short notes on design of satellite links for specified C/N.	[7]
5	a)	Compare FDMA, TDMA and CDMA techniques.	[8]
	b)	Write notes on Satellite Switched TDMA Onboard processing.	[7]
6	a)	Draw and explain the block diagram of transmitter for the earth station.	[8]
	b)	Write short notes on the Low noise amplifier used in the receiver of an earth station.	[7]
7	a)	What is a geo stationary satellite and list the system considerations for the same.	[8]
	b)	Write notes on Delay & Throughput considerations for a geo stationary satellite.	[7]
8	a)	Explain in detail GPS Position Location principles.	[8]
	b)	Write notes on Differential GPS.	[7]

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Set No. 2

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SATELLITE COMMUNICATIONS
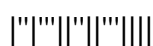### (Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Discuss in detail about the development of Satellite communication in the world scenario. [8]

   b) The orbital period of a satellite is 650 minutes. Determine the semi major axis of the elliptical orbit. [7]

2 a) Explain the various Orbital perturbations for a satellite. [8]

   b) Discuss in detail Orbital effects in communication systems performance. [7]

3 a) Explain the Tracking, telemetry and Command sub system of a spacecraft. [8]

   b) Write short notes on the power systems used in the spacecraft. [7]

4 a) What is G/T ratio and explain its significance for the quality of communication. [8]

   b) Write short notes on Design of down links and Up link of a spacecraft. [7]

5 a) Explain using neat diagrams about the Frequency division multiple access (FDMA) system. [8]

   b) Compare the TDMA and CDMA systems. [7]

6 a) Draw and explain the block diagram receiver for the earth station. [8]

   b) Write short notes on the various antennas used for the spacecraft. [7]

7 a) What are the coverage and frequency considerations for a Geo stationary satellite. [8]

   b) Prove that the distance between the center of the earth to the Geo synchronous Satellite is 42,242 KM. [7]

8 a) Explain in detail about the GPS receiver operation. [8]

   b) Write short notes on GPS Receivers and codes. [7]

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Set No. 3

IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
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1 a) List the Orbital elements. Explain the effect of eclipse on the satellite with neat
   diagrams. [8]
  b) The apogee and perigee of an elliptical satellite orbits are 3000 Km and 200
   Km. Determine the eccentricity, semi-major axis and semi-minor axis. [7]

2 a) Explain the mechanism of launching a satellite. [8]
  b) A satellite is moving in an elliptical transfer orbit with apogee and peigee at a
   distance of 35000 km and 500 km. If the radius of the earth is 6360 km,
   determine the velocity of a satellite at any point on its orbit. [7]

3 a) Explain the communication subsystems of a spacecraft using a block diagram. [8]
  b) Write short notes on Equipment reliability and Space qualification. [7]

4 a) Explain the concept of system noise temperature in satellite communication
   using block diagram. [8]
  b) Define G/ T ratio and give its importance in satellite communication. [7]

5 a) Compare between FDMA and CDMA systems. [8]
  b) Explain in detail about the Time division Multiple Access (TDMA) Frame
   structure. [7]

6 a) List the earth station design requirements. [8]
  b) Write short notes on earth station antennas. [7]

7 a) Define a Geostationary satellite and explain the frequency considerations for
   the same. [8]
  b) Discuss the Delay & Throughput considerations for a Geo stationary satellite. [7]

8 a) Write short notes on GPS receiver operation. [8]
  b) Explain the working of a Differential GPS. [7]

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IV B.Tech II Semester Regular/Supplementary Examinations, April/May - 2016
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1	a)	Define Keplers laws and list the orbital elements of a satellite.	[8]
	b)	Calculate the velocity of an artificial satellite orbiting the earth in a circular orbit at an altitude of 200 Km above the earth's surface.	[7]
2	a)	Write notes on Orbital effects in communication systems performance.	[8]
	b)	What are Orbital perturbations in satellite communication.	[7]
3	a)	Explain the Attitude and orbit control system for a spacecraft.	[8]
	b)	Explain the working of telemetry, tracking, Command and monitoring sub system of a spacecraft.	[7]
4	a)	Derive the power received from the satellite at the earth station from the basic transmission theory.	[8]
	b)	Write short notes on Design of satellite links for specified C/N.	[7]
5	a)	Compare FDMA, TDMA and CDMA techniques.	[8]
	b)	Explain in detail about the Time division Multiple Access (TDMA) Frame structure.	[7]
6	a)	Draw and explain the block diagram of transmitter for the earth station.	[8]
	b)	Write short notes on earth station antennas.	[7]
7	a)	Define a Geostationary satellite and explain the frequency considerations for the same.	[8]
	b)	Write notes on Delay & Throughput considerations for a geo stationary satellite.	[7]
8	a)	Write short notes on GPS receiver operation.	[8]
	b)	Write notes on GPS Navigation Message and GPS signal levels.	[7]

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IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
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*****

1. Give comparative study between LEO, MEO, GEO and HEO types of satellites.

2. a) Define the following terms:
     i) Time of perigee   ii) Mean Anomaly
     iii) First point of Aries   iv) Right Ascension
   b) What is an Eclipse? How it affects the satellite function? Explain the way by which the satellite functions normally.

3. a) Explain in detail about tracking subsystem with neat block diagram.
   b) What is Doppler effect? Explain how it is useful for tracking.

4. a) Explain the concept of noise temperature in satellite link design.
   b) Discuss the calculation of system noise temperature.

5. a) What do you mean by multiple accesses in satellite communication?
   b) Calculate the frame efficiency of TDMA frame of period 2.2ms.Total frame
      length=128000 symbols
      Guard interval = 110 symbols
      No.of Traffic bursts\ frame =14
      No. of Reference burst\frame = 1
      CDC during reference burst = 10 symbols
      No. of Preamble =208symbols

6. a) Explain the small earth station with a neat diagram.
   b) Explain the very small Aperture terminals [VASTS].

7. 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. a) Explain the following in GPS C/A code accuracy:
     i) HDOP   ii) VDOP   iii) GDOP
   b) Explain how the accuracy in GPS measurement is increased.

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IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

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1. a) Explain the basic differences between an Active and passive satellites.
    b) Give brief idea about mobile satellite communication.

2. a) Draw and geometry of a geostationary link showing elevation, azimuth and range.
    b) A geostationary satellite moving in an equatorial circular orbit is at a height of 35786Km. from the earth's surface. If the earth radius is taken as 6378Km, determine the theoretical maximum coverage angle and maximum slant range.

3. a) Discuss the orbit control system in brief.
    b) Draw the simplified block diagram of satellite subsystem for 6/4GHz band.

4. 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 17dB in a 27MHz, 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.

5. a) Explain the function of the preamble in a TDMA traffic burst.
    b) Write about satellite switched TDMA?

6. a) Explain different tracking techniques used in tracking satellite with a large antennae.
    b) Discuss the design considerations of large antennae.

7. Explain the following in LEO:
    a) Internal growth   b) Interim operations
    c) Replenishment options   d) End-to-End system implementations

8. a) Define the following:
       i) C/A code   ii) Selective availability
    b) Write the GPS services.

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IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**

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1. List the various frequency bands being used in satellite communication. Compare the advantages and disadvantages of different bands considering the effects of propagation media.

2. a) Discuss the factors which determine the choice of orbit for a communication satellite.
   b) Show that the height of Geo-synchronous orbit is about 36,000Kms.
   c) Find the coverage area of a satellite from which it is visible at a minimum elevation angle of 10^0 for the Geo-synchronous orbit.

3. a) List the various satellite subsystems and state their purpose and principle parameters that characterize them quantatively.
   b) Explain the following:
      i) Telemetry   ii)Tracking and Command

4. a) Explain the design procedure of satellite communication link.
   b) Thermal noise in an earth station receiver results in a $(C/N)d_N$ ratio of 20.0dB. A signal is received from a bent pipe transponder with a carrier to noise ratio $(C/N)_{Up} = 20.0$dB. What is the value of overall $(C/N)_O$ ratio at the earth station. If the transponder introduces inter-modulation products with (C/I) ratio=24dB. What is the overall $(C/N)_o$ ratio at the receiving earth station.

5. a) Explain structure of traffic data burst in TDMA.
   b) Differentiate the multiplexing and multiple access techniques.

6. a) Explain the operation of dish antenna. How do you reduce aperture blockage?
   b) Describe in detail, why an earth station is located at an altitude?

7. a) What are the basic characteristics features of NGSO?
   b) How the non-geo proposals are categorized?

8. a) What is meant by GPS Navigation message?
   b) Write sub frame details of GPS navigation message?

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Code No: **R42043**

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Set No. 4

IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
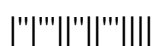## SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) List the various benefits and draw backs of satellite communications.
   b) Explain the various reasons for preferring satellite than optical fibers which are providing very high band width.

2. a) The semi major and semi minor axis of an Elliptical satellite orbit are 20,000Km and 16,000Km respectively. Determine the apigee and perigee distances.
   b) A geosynchronous satellite moving in an equatorial circular orbit at a height of 35000 Km above the surface of the Earth gets inclined at an angle of 2^0 calculate the maximum deviation in latitude and also maximum deviation in longitude. Determine the maximum displacements in Km caused by latitude and longitude displacements.

3. a) Explain difference types of redundancy connections to complete subsystem reliability of a satellite system.
   b) Write short notes on Spacecraft subsystems.

4. a) What are the factors on which a digital communication satellite link depends on? Explain in brief.
   b) Calculate the rain attenuation in the case of a 6/4GHz link if the probability of rain rate for 0.01% of time is 25mm/hr. The earth station is situated at an altitude of 3450ft. Use both SAM and CCIR model for a $=42.1 \times 10^{-6} f^{2.42}$ and b= $1.5f^{-0.08}$

5. a) Explain the back-off in FDMA.
   b) Explain how intermodulation frequencies are generated in FDMA.

6. In earth station explain:
   a) Low-noise amplifier
   b) High power amplifier and mention advantages and disadvantages and applications.

7. a) What factors are used to put interest on NGSO?
   b) What is meant by sun sync orbit? Explain.

8. a) Explain the signal processing techniques used in GPS receiver.
   b) What are the successful measurements in a GPS C/A code receiver?

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Code No: **R42043**

R10

Set No. 1

IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. Give comparative study between LEO, MEO, GEO and HEO types of satellites.

2. a) Define the following terms:
     i) Time of perigee   ii) Mean Anomaly
     iii) First point of Aries   iv) Right Ascension
   b) What is an Eclipse? How it affects the satellite function? Explain the way by which the satellite functions normally.

3. a) Explain in detail about tracking subsystem with neat block diagram.
   b) What is Doppler effect? Explain how it is useful for tracking.

4. a) Explain the concept of noise temperature in satellite link design.
   b) Discuss the calculation of system noise temperature.

5. a) What do you mean by multiple accesses in satellite communication?
    b) Calculate the frame efficiency of TDMA frame of period 2.2ms.Total frame
        length=128000 symbols
        Guard interval = 110 symbols
        No.of Traffic bursts\ frame =14
        No. of Reference burst\frame = 1
        CDC during reference burst = 10 symbols
        No. of Preamble =208symbols

6. a) Explain the small earth station with a neat diagram.
   b) Explain the very small Aperture terminals [VASTS].

7. 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. a) Explain the following in GPS C/A code accuracy:
       i) HDOP   ii) VDOP   iii) GDOP
   b) Explain how the accuracy in GPS measurement is increased.

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Code No: **R42043** # R10 Set No. 2

IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**
Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) Explain the basic differences between an Active and passive satellites.
    b) Give brief idea about mobile satellite communication.

2. a) Draw and geometry of a geostationary link showing elevation, azimuth and range.
    b) A geostationary satellite moving in an equatorial circular orbit is at a height of 35786Km. from the earth's surface. If the earth radius is taken as 6378Km, determine the theoretical maximum coverage angle and maximum slant range.

3. a) Discuss the orbit control system in brief.
    b) Draw the simplified block diagram of satellite subsystem for 6/4GHz band.

4. 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 17dB in a 27MHz, 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.

5. a) Explain the function of the preamble in a TDMA traffic burst.
    b) Write about satellite switched TDMA?

6. a) Explain different tracking techniques used in tracking satellite with a large antennae.
    b) Discuss the design considerations of large antennae.

7. Explain the following in LEO:
       a) Internal growth   b) Interim operations
       c) Replenishment options   d) End-to-End system implementations

8. a) Define the following:
        i) C/A code   ii) Selective availability
    b) Write the GPS services.

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Code No: **R42043** **R10** Set No. 3

IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. List the various frequency bands being used in satellite communication. Compare the advantages and disadvantages of different bands considering the effects of propagation media.

2. a) Discuss the factors which determine the choice of orbit for a communication satellite.
   b) Show that the height of Geo-synchronous orbit is about 36,000Kms.
   c) Find the coverage area of a satellite from which it is visible at a minimum elevation angle of 10^0 for the Geo-synchronous orbit.

3. a) List the various satellite subsystems and state their purpose and principle parameters that characterize them quantatively.
   b) Explain the following:
      i) Telemetry   ii)Tracking and Command

4. a) Explain the design procedure of satellite communication link.
   b) Thermal noise in an earth station receiver results in a $(C/N)d_N$ ratio of 20.0dB. A signal is received from a bent pipe transponder with a carrier to noise ratio $(C/N)_{Up}$ = 20.0dB. What is the value of overall $(C/N)_O$ ratio at the earth station. If the transponder introduces inter-modulation products with (C/I) ratio=24dB. What is the overall $(C/N)_o$ ratio at the receiving earth station.

5. a) Explain structure of traffic data burst in TDMA.
   b) Differentiate the multiplexing and multiple access techniques.

6. a) Explain the operation of dish antenna. How do you reduce aperture blockage?
   b) Describe in detail, why an earth station is located at an altitude?

7. a) What are the basic characteristics features of NGSO?
   b) How the non-geo proposals are categorized?

8. a) What is meant by GPS Navigation message?
   b) Write sub frame details of GPS navigation message?

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Code No: **R42043**

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IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015
SATELLITE COMMUNICATIONS
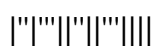### (Electronics and Communication Engineering)

Time: 3 hours   **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1. a) List the various benefits and draw backs of satellite communications.
   b) Explain the various reasons for preferring satellite than optical fibers which are providing very high band width.

2. a) The semi major and semi minor axis of an Elliptical satellite orbit are 20,000Km and 16,000Km respectively. Determine the apigee and perigee distances.
   b) A geosynchronous satellite moving in an equatorial circular orbit at a height of 35000 Km above the surface of the Earth gets inclined at an angle of 2^0 calculate the maximum deviation in latitude and also maximum deviation in longitude. Determine the maximum displacements in Km caused by latitude and longitude displacements.

3. a) Explain difference types of redundancy connections to complete subsystem reliability of a satellite system.
   b) Write short notes on Spacecraft subsystems.

4. a) What are the factors on which a digital communication satellite link depends on? Explain in brief.
   b) Calculate the rain attenuation in the case of a 6/4GHz link if the probability of rain rate for 0.01% of time is 25mm/hr. The earth station is situated at an altitude of 3450ft. Use both SAM and CCIR model for a $=42.1 \times 10^{-6}$ $f^{2.42}$ and b= $1.5f^{-0.08}$

5. a) Explain the back-off in FDMA.
   b) Explain how intermodulation frequencies are generated in FDMA.

6. In earth station explain:
   a) Low-noise amplifier
   b) High power amplifier and mention advantages and disadvantages and applications.

7. a) What factors are used to put interest on NGSO?
   b) What is meant by sun sync orbit? Explain.

8. a) Explain the signal processing techniques used in GPS receiver.
   b) What are the successful measurements in a GPS C/A code receiver?

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Code No: **R42043**

R10

Set No. 1

IV B.Tech II Semester Supplementary Examinations, July – 2016
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) Discuss the history of satellite communication. [7]

   b) Draw the block diagram for satellite communication system. Explain the function of each block. [8]

2 a) Describe the orbit and explain how the satellite is located with respect to the earth. [7]

   b) Draw the geometry of a geostationary link showing elevation, azimuth and range. [8]

3 a) Draw the block diagram of typical onboard control system for a spinner satellite and explain its operation. [7]

   b) Write a short note on Telemetry and Tracking. [8]

4 a) Derive the equation for the power received by an earth station from a satellite transmitter. [7]

   b) Discuss about the noise temperature. [8]

5 a) Explain the frequency division multiple access of satellite system with one example. [7]

   b) Derive the overall carrier to noise ratio in FDMA. [8]

6 a) Draw the simplified diagram of large earth station equipment using FDM/FM/FDMA technology and explain each block in detail. [7]

   b) What are the different types of antenna mounts? [8]

7 a) Explain the orbital consideration and constellation size of NGSO. [7]

   b) Explain the general aspects of coverage and frequency consideration of low earth orbit. [8]

8 a) Explain in detail about GPS position location. [7]

   b) Explain about signal processing techniques used in GPS receiver. [8]

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IV B.Tech II Semester Supplementary Examinations, July/August - 2017
SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 75

Answer any FIVE Questions
All Questions carry equal marks
*****

1 a) List the various frequency bands being used in satellite communication. Compare the advantages and disadvantages of different bands considering the effects of propagation media. [8]
  b) Discuss the application of satellite communication [7]

2 a) What is meant by look angles? Explain them with reference to a geostationary satellite. [8]
  b) Write a detailed summary of expendable launch vehicles. [7]

3 a) What is Doppler effect? Explain how it is useful for tracking. [8]
  b) Write a short note on "spacecraft subsystem". [7]

4 a) Explain the design of downlink in satellite communication. [8]
  b) Explain the design procedure of satellite communication link. [7]

5 a) Describe the general features of an on-board signal processing transponder that would allow a network to operate with FDMA uplink and a TDMA downlink. [8]
  b) Write short notes on CDMA. [7]

6 a) Draw and explain the simplified earth station receiver. [8]
  b) Explain the operation on deriving mechanism of antenna employed in the earth station. [7]

7 a) Explain the delay and throughput in satellite communication. [8]
  b) Explain the terminal characteristics and common requirement of NGOSS. [7]

8 a) What are the major sources of errors in a GPS receiver? [8]
  b) Explain the technique of range error budget used to provide accuracy in GPS C/A code receiver. [7]