Code No: **R42043** **R10** **Set No. 1**

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

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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]

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

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
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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]

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

All Questions carry equal marks

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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]

Code No: **R42043** **R10** **Set No. 4**

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

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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]