

Code No: **R42043**

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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** All Questions carry equal marks ***** 1 a) Explain the various applications of satellite communications. [8] b) Describe the future trends of satellite communications. [7] List and explain the different orbital effects in satellite communication system 2 a) 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] With the help of a neat block diagram describe the various functions of an earth 6 a) 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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Set No. 2

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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	
0		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]
/	a) b)	Compare GEO and MEO satellites	[0]
	U)	Compare OLO and MEO salemiles.	[/]
8	a)	Explain the generation of GPS signals with a neat sketch.	[8]
	b)	Describe the applications of GPS.	[7]

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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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Time: 3 hours

Max. Marks: 75

Answer any FIVE Questions All Questions carry equal marks

1	a) b)	Explain the functions of space segment and ground segment of a satellite system. What are the different frequencies used for satellite communications? Explain.	[8] [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]