

Code No: 07A7EC18

R07**Set No. 2****IV B.Tech I Semester Examinations, November 2010****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**

1. Write in detail about the differential GPS. [16]
2. (a) Compare the Satellite and Optical Fiber Communications.
(b) State briefly the Areas of Applications where each system is best suited. [8+8]
3. What are the orbital parameters required to determine a satellite's orbit? Name and explain them. [16]
4. 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 different from that of very small aperture techniques? State reasons for this difference? [16]
5. (a) A Satellite is orbiting in a geostationary orbit of radius 41500 Km. Find the velocity and time of orbit. What will be the change in velocity if the radius changes to 36000 Km. Assume g_0 is $398600.5 \text{ Km}^3 / \text{Sec}^2$.
(b) Mention the effect of gravitational force due to Sun and Moon on the orbital motion of a Satellite. [8+8]
6. Explain the following:
 - (a) Satellite based store-and-forward message
 - (b) Earth station based-store-and-forward. [8+8]
7. (a) An Uplink at 14 GHz requires a saturation flux density of -91.4 dB w/m^2 and an input back off of 11 dB. The satellite G/T is -6.7 dBK^{-1} and receiver feeder losses amount to 0.6 dB. Calculate the C/N ratio.
(b) For the system shown in figure above, the receiver noise shown in figure below 7b is 12dB, the cable loss is 5dB, the LN Again is 50dB and the noise temperature is 150^0K . The antenna noise temperature is 35^0K . Calculate the noise temperature referred to the input. [8+8]

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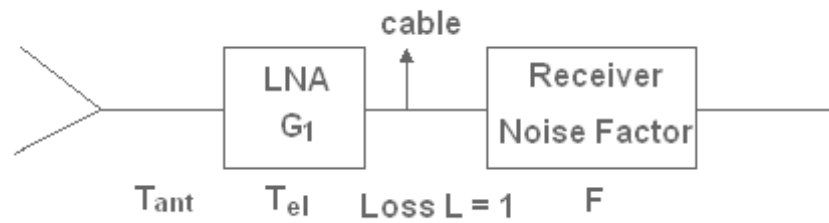
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Figure 7b

8. (a) Explain Intermodulation between two C-band carriers in a Transponder with third-order nonlinearities.
- (b) Calculate the C/N with Intermodulation. [10+6]

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R07**Set No. 4****IV B.Tech I Semester Examinations, November 2010****SATELLITE COMMUNICATIONS****Common to Electronics And Telematics, Electronics And Communication Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
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1. (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]
2. Discuss the frequency allocations for various Satellite services in detail. [16]
3. (a) Discuss the receiver working in Earth station with suitable diagrams?
(b) Explain various LNA's used? [8+8]
4. (a) Explain about 6/4 GHz Communication Subsystem in detail with neat schematics.
(b) The earth subtends an angle of 17° when viewed from geostationary orbit. What are the dimensions and gain of horn antenna that will provide global coverage at 4 GHz. [8+8]
5. (a) What is a guard time? Mention its value in a typical TDMA system. Explain its importance in TDMA frame efficiency?
(b) Calculate the preamble period and frame efficiency with the help of following:
No. of Traffic burst=12
Frame period = 10 milliseconds
Total number of equivalent frame bits = 64000
CBR = 56 bits, UW = 28bits, SIC = 16 bits,
Miscellaneous information =24 bits. [8+8]
6. Explain how the Synchronous orbit of a Geostationary Satellite is determined. Also explain why these satellites are not capable of illuminating polar regions. [16]
7. Explain the following NGOSS:
(a) QOS
(b) Spectrum available
(c) Health and electromagnetic interference EMI issues. [6+5+5]
8. Explain how DGPS are used to calculate the error in GPS position measurement? [16]

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R07**Set No. 1****IV B.Tech I Semester Examinations, November 2010****SATELLITE COMMUNICATIONS****Common to Electronics And Telematics, Electronics And Communication Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
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1. Discuss the brief history of Satellite Communications. [16]
2. (a) Explain the schematic of a Molniya orbit and operational Molyniyaan system.
(b) Explain radiation effects. [10+6]
3. What is meant by Look Angles? Explain them with reference to a Geostationary Satellite. [16]
4. (a) Derive the overall carrier to noise ratio in FDMA.
(b) Explain why Back off is generally necessary in FDMA? And not in TDMA. [12+4]
5. (a) Draw the satellite uplink model and discuss each block.
(b) On satellite Communication System, the satellite is at a height of 40000Km above earth, the frequency used is 4 GHz, the transmitter antenna gain is 65 dB and the receiving antenna gain is 35 dB Calculate:
i. The free space transmission loss
ii. The received power when the transmitter power is 150 Watts. [8+8]
6. (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]
7. (a) Explain the function of the non-coherent delay lock loop in GPS receiver.
(b) Explain the costas loop in GPS receiver. [8+8]
8. (a) Draw the Simplified block diagram of Intel Sat V Communication System and explain its function.
(b) Explain frequency reuse antennas. [10+6]

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R07**Set No. 3****IV B.Tech I Semester Examinations, November 2010****SATELLITE COMMUNICATIONS****Common to Electronics And Telematics, Electronics And Communication Engineering****Time: 3 hours****Max Marks: 80****Answer any FIVE Questions
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1. (a) What is meant by low earth orbit and geostationary satellite systems?
(b) Why the geostationary orbit has been preferred for satellite communication system. [8+8]
2. (a) Why Telemetry, Tracking and command are necessary for a satellite system. Explain in detail with neat schematics.
(b) Draw Redundant TWTA Configuration in HPA of 6/4 GHz bent pipe transponder. Explain. [8+8]
3. (a) Mention the types of FDMA?
(b) List out the interference in FDMA.
(c) Compute the Transmitted power of a satellite using FDMA. [2+6+8]
4. (a) List the various Benefits and Drawbacks of Satellite Communications.
(b) Explain the various reasons for preferring Satellites than Optical Fibers which are providing very high bandwidth. [8+8]
5. (a) What are the factors that effect the uplink and down link design in geo stationary satellite system. Discuss in detail.
(b) For an EIRP of 100 dBW, a carrier frequency of 10 GHz and the distance between earth station and satellite of 36000Km. Calculate the CNR in 10MHz bandwidth if the ground station G/T is 20 dB/K. [8+8]
6. (a) What are the different types of antenna mounts?
(b) Suppose the receiver antenna is a parabolic dish antenna with diameter of 1.75m and is operation with a horn at 5.956GHz. Calculate the antenna operation and the gain in db. The efficiency of receiving antenna is 80%? [6+10]
7. (a) What is meant by kinematic DGPS?
(b) What are difficulties in DGPS? [8+8]
8. (a) Explain about Expendable launch vehicle(ELVs)
(b) An Low earth orbit satellite is in circular polar orbit with an altitude of 1000 km. A Transmitter on the satellite has a frequency of 2.65 G Hz. Find:
 - i. The velocity of the satellite in orbit

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- ii. The component of velocity toward an observer at an earth station as the satellite appears over the horizon, for an observer who is in the plane of the satellite orbit.
- iii. The Doppler Shift of the received signal at an earth station.
- iv. Find also the Doppler shift for a satellite signal (transmitted by Ka band transmitter at 20.0 GHz). When it is received by the same observer. [8+8]

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