

(Library)

Sem - VII / Rev / EXTC.
Satellite Comm.

25/5/09

Con. 3052-09.

(REVISED COURSE)

VR-4269

(3 Hours)

[Total Marks : 100

N.B. (1) Question No. 1 is **compulsory**.

(2) Answer any **four** out of remaining **six** questions.

(3) Assume any **suitable data** wherever **required**.

1. (a) Does eclipse occur when satellite get shadowed by the moon ? Why ? 20
(b) Calculate look angles for earth station antenna on equator to receive from geostationary satellite :—
(i) Immediately East
(ii) Immediately West.
(c) Explain Intermodulation noise.
(d) Explain in brief elements of a feed system in earth station.
2. (a) Why does a satellite orbit deviate from the predictions of Kepler's laws ? Outline the principal of Sun-synchronous and Molniya orbits. 10
(b) Describe effects of rain on satellite link. 10
3. (a) What is telemetry, tracking and command subsystem ? Explain its functions. 10
(b) Why TDM is the only option for digital satellite link. Explain the reasons. Why Intermodulation products are not prevalent in TDM ? 10
4. (a) Why traveling wave tube amplifier is used aboard satellite compared to other type of high power amplifying devices ? Why the low noise amplifier of receiving system is placed at the antenna end of the feeder cable. 10
(b) Derive general link equation. Find expression for C/N and G/T ratio. Explain importance of these ratios in satellite link design. 10
5. (a) What is reference burst for TDMA ? Explain preamble, carrier recovery sequence, unique word, station identification code, guard time. 10
(b) Most commercial communication satellite must maintain their orbital position to within plus or minus 0.1° of arc. If a satellite needs this condition and is in geostationary orbit describe the "Box" in which satellite is constrained to move. 10
6. (a) A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.1 GHz. The signal is received by a satellite at a distance of 37,500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 K, a bandwidth of 36 MHz, and a gain of 110 dB. 10
(i) Calculate the path loss at 6.1 GHz.
(ii) Calculate the power at the output port (sometimes called the output waveguide flange) of the satellite antenna, in dBW.
(iii) Calculate the noise power at the transponder input, in dBW.
(iv) Calculate the C/N ratio, in dB, in the transponder.
(v) Calculate the carrier power, in dBW and in watts, at the transponder output.
(b) (i) Explain ionospheric depolarization and rain depolarization. 10
(ii) What is the difference between cross polarization discrimination and polarization isolation ?

7. Write short notes (any **four**) :—

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- (a) Large Cassegrain Antenna
 - (b) Code Division Multiple Access
 - (c) SPADE System
 - (d) Limits of Visibility
 - (e) Transponder .
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