

Code: 9A04803

R09

B.Tech IV Year II Semester (R09) Advanced Supplementary Examinations June/July 2016

SATELLITE COMMUNICATIONS

(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) In detail, write a note on differentiating active and passive satellites.
(b) Describe the growth and development of satellite communication.
- 2 (a) Derive the expression for velocity of a spaced craft at its Perigee and Apogee in terms of semi major axis and eccentricity.
(b) Derive expressions for look angles.
(c) List the launch pads available in our country, giving their locations and other useful characteristics in terms of their advantages.
- 3 (a) Define orbital elements. Draw the block diagram of AOCS control and explain the part played by each block.
(b) Write a detailed note on system reliability. Explain about bath-tub curve.
- 4 (a) Define system noise temperature. How does it affect the C/N and G/T ratios?
(b) An earth station receiving antenna delivers -119 dBm carrier power at the antennas output flange. The antenna noise temperature is 60 K. Following the antenna is a wave-guide with 1 dB of loss and a physical temperature of 290 K. The output of the wave-guide is connected to a Ga As FET amplifier with the noise figure of 5 dB and a gain of 22 dB. Following the amplifier is a mixer with a noise figure of 15dB. Calculate: (i) Ga As FET amplifier noise temperature. (ii) Mixture noise temperature. (iii) Waveguide effective input noise temperature. (iv) The overall noise temperature of the receiver, referred to antenna output port. (v) The overall noise temperature of the receiver, referred to Ga As FET input port. (vi) The receiver for a 200 Hz bandwidth.
- 5 (a) Compare advantages and disadvantages of TDMA, FDMA and CDMA.
(b) Draw the block diagram of CDMA and explain.
- 6 (a) Draw the block diagram of a typical earth station and describe all the design requirements.
(b) An earth station having an antenna of 27 m diameter and overall efficiency of 60% operating at 4.2 GHz. At this frequency the system temperature is 72°K when the satellite is at an elevation angle of 20°. Calculate the figure of merits of the earth station. If the sky noise temperature rises to 83°K, what would be the new figure of merit?
- 7 (a) With the help of a neat sketch of the eclipse geometry, define umbra and penumbra. Find the eclipse duration when the Sun is at equinox.
(b) Write a comparative note on LEOs, MEOs and GEOs.
- 8 (a) How GPS receivers are classified based on their applications.
(b) Explain the concept of Differential GPS receiver with neat sketch.
