

DECEMBER 2006

Code: D-17
Time: 3 Hours

Subject: ELEMENTS OF SATELLITE COMMUNICATION
Max. Marks: 100

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q. 1. must be written in the space provided for it in the answer book supplied and nowhere else.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or best alternative in the following: (2x10)

a. ITU has divided the world into

- (A) 3 regions (B) 4 regions
(C) 2 regions (D) 6 regions

b. The number of satellites in GPS system is

- (A) 90 (B) 24
(C) 40 (D) 20

c. The gain of the earth station antenna is given by equation

- (A) $G = \frac{4\pi A}{\lambda^2}$ (B) $G = \frac{4\pi A}{\lambda}$
(C) $G = \frac{4\pi \lambda^2}{A}$ (D) $G = \frac{4\pi}{A\lambda^2}$

d. With reference to satellite orbit, apogee is the

- (A) farthest point in the orbit
(B) nearest point in the orbit
(C) point in the parking orbit
(D) name given to the boost motor that puts the satellite in the right parking slot.

e. Satellite video and telephone signals can be delivered with SNRs of ____ dB using WBFM.

- (A) 20 (B) 30
(C) 40 (D) 50

- f. Satellites for mobile communications use carrier frequencies ranging from
- (A) 137 to 2500 MHz (B) 4 GHz to 6 GHz
(C) 12 GHz to 18 GHz (D) 18 GHz to 26 GHz
- g. Multipoint capabilities are more in
- (A) Fiber optics (B) Satellites
(C) Ethernet (D) Telephones
- h. The spread spectrum communication techniques are used in one of the following multiple access methods in satellite communication
- (A) TDMA (B) CDMA
(C) FDMA (D) Random Access
- i. In the C band transponders, the uplink frequency is about
- (A) 6 GHz (B) 4 GHz
(C) 14 GHz (D) 11 GHz
- j. Long distance communication system via satellite in Ku band uses frequencies in the range of
- (A) 3-6 GHz (B) 11-14 GHz
(C) 100-200 GHz (D) 3-6 MHz

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

- Q.2** a. Draw block diagram of satellite communication system. (8)
- b. Explain briefly, how geo-stationary satellites are launched into their orbits. (8)
- Q.3** a. Sketch the block diagram of a receiving satellite earth station and the explain function of each block. (10)
- b. Explain in brief, how satellites are classified based on their orbits. (6)
- Q.4** a. Derive the link equations as referred to a geo-stationary satellite. (12)
- b. Name the parameters considered while selecting up and down link frequencies. (4)
- Q.5** Write down the short notes on

- (i) Direct broadcast satellites.
- (ii) Satellite transponders. **(16)**

Q.6 a. Compare satellite communication and fiber optic communication. **(4)**

b. Explain the terms

- (i) Foot print.
- (ii) Look angle.
- (iii) Attitude control.
- (iv) TTC

(12)

Q.7 a. Explain Antenna systems used in (i) Earth stations (ii) Satellite stations. **(9)**

b. Write briefly on INSAT series of satellites. **(7)**

Q.8 a. Compare TDMA, FDMA and SSMA. **(6)**

b. How analog TV transmission is achieved in satellite communication? Derive the SNR/CNR relations for such a system.

(10)

Q.9 a. Explain telephone services via satellite. **(4)**

b. Draw and explain a concept of a cable transmission network with a block diagram. **(12)**