

DiplETE – ET (OLD SCHEME)

Code: DE17
Time: 3 Hours

Subject: ELEMENTS OF SATELLITE COMMUNICATION

Max. Marks: 100

JUNE 2010

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 the best alternative in the following: (2 × 10)

- a. Satellite transponders _____.
- (A) use a single frequency for reception and retransmission of information to and from earth
 (B) use a lower frequency for reception and a higher frequency for retransmission
 (C) use a higher frequency for reception and a lower frequency for retransmission
 (D) use S band for reception and X band frequency for transmission
- b. The orbital velocity of the satellite
- (A) is directly proportional to its distance from earth's surface
 (B) is inversely proportional to square root of its distance from earth's center.
 (C) depends upon the thrust with which it is launched
 (D) is continuously changing as the satellite moves
- c. The angular velocity (ν) of a satellite at a height (H) from the surface of the earth with a mean radius of R is given by
- (A) $\nu = R\sqrt{g/(R+H)}$ (B) $\nu = \sqrt{Gg/(R+H)}$
 (C) $\nu = Rg/\sqrt{(R+H)}$ (D) $\nu = \sqrt{GMm/(R+H)}$
- d. Satellite S1 and S2 are orbiting in two different equatorial circular orbits. The radius of S1 orbit is four times the radius of S2 orbit. The orbital period of S1 orbit will therefore be
- (A) Four times the orbital period of S2
 (B) Eight times the orbital period of S2
 (C) Two times the orbital period of S2
 (D) Same as the orbital period of S2
- e. The satellite tracking stations are placed in remote areas in order to minimize the effect of
- (A) Solar noise (B) Man made noise
 (C) Cosmic noise (D) Thermal noise
- f. The range of Ku Band is
- (A) 24 – 36 GHz (B) 12 – 18 GHz
 (C) 16 – 24 GHz (D) 24 – 40 GHz
- g. In broadcast satellites, the high power transmitters are based on

- b. Determine the orbital velocity of a satellite moving in a circular orbit at a height of 150 km above the surface of earth given that gravitation constant, $G = 6.67 \times 10^{11} \text{ N-m}^2/\text{kg}^2$, mass of earth $M = 5.98 \times 10^{24} \text{ kg}$, and radius of earth $R = 6370 \text{ km}$

(6)

- Q.8** a. Explain basic DBS-TV system and mention the features and specifications of a Typical DBS-TV satellite system. (9)

- b. Explain Network Architecture of a Cable TV system (7)

- Q.9** Explain the following; (2 × 8)

- (i) Weather Forecasting with Satellite.
(ii) INSAT-I Satellite Series