Code: DE17 **Subject: ELEMENTS OF SATELLITE COMMUNICATION**
Time: 3 Hours **Max. Marks: 100**

DECEMBER 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.**
- **The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.**
- **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. Which one of the following satellite system is used for weather forecast application?

(A) COMSAT **(B)** SPOT
(C) TIROS-N **(D)** none of the above

b. 6 GHz / 4 GHz bands are most popular for satellite communication because……..

(A) RF components for these bands are readily available
(B) Rain attenuation is not much serious at these bands
(C) Sky noise is low at 4 GHz
(D) All the above

c. The multiple satellite access techniques which is suitable only for digital transmission is

(A) Frequency Division Multiple Access(FDMA)
(B) Time Division Multiple Access(TDMA)
(C) Either (a) or (b)
(D) Both (a) and (b)

d. Time needed to complete one revolution around the earth by a geo-stationary satellite is approximate

(A) 13 hours 56 minutes
(B) 23 hours 56 minutes
(C) 36 hours 40 minutes
(D) The satellite is stationary thus no revolution

e. The INSAT operates in

(A) C - band
(B) S - band
(C) L – band
(D) none of the above

f. The range of K band is

(A) 1-2 GHz
(B) 16-24 GHz
(C) 24-36 GHz
(D) none of the above

g. DAMA stands for

(A) Direct Assigned Multiple Access
(B) Differential Assigned Multiple Access
(C) Digital Assigned Multiple Access
(D) Demand Assigned Multiple Access

h. Digital DBS-TV signals are transmitted as

(A) 20-Mbps PSK
(B) 10-Mbps PSK
(C) 20-Mbps QPSK
(D) 10-Mbps QPSK

i. The angles (coordinates) to which an earth station antenna must be pointed to communicate with the geosynchronous satellite are

(A) Direct angles
(B) Equatorial angles
(C) Inclined angles
(D) Look angles

j. In the data broadcast services of the VSAT application, data is up linked from....

(A) a central location and received by many users
(B) many location and received by a central user
(C) many location and received by many users
(D) a central location and received by a central user

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

Q.2 a. (i) List out the frequency bands used for satellite services. **(2)**
(ii)What are the advantages and disadvantages of satellite communication? **(6)**

b. For a satellite earth station receiver working on 4 GHz, the typical various gains and noise temperatures are $T_{in} = 50$ K, $T_{RF} = 50$ K, $T_m = 500$ K, $T_{IF} = 1000$ K, $G_{RF} = 23$dB, $G_m = 0$ dB, $G_{IF} = 30$ dB. Calculate the system noise temperature. **(8)**

Q.3 a. What is meant by Station keeping? **(6)**

b. Write note on ASK, PSK, FSK, and QPSK. **(2.5×4)**

Q.4 a. Compare TDMA & FDMA. What are the advantages of TDMA over FDMA? **(8)**

b. Explain the functions of any **ONE** of the following satellite sub systems.
(i) Repeater
(ii) Telemetry tracking and command system. **(8)**

Q.5 a. Explain FDM technique used for satellite communication. **(8)**

b. Explain spread spectrum technique used for satellite communication? **(8)**

Q.6 a. Explain how the location of satellite in an orbit is carried out with respect to Earth? **(8)**

b. Explain what the abbreviation SCPC stands for. Explain in detail the operation of a simple SCPC system. **(8)**

Q.7 a. What are the equipments that an earth station requires? Discuss their design requirement. **(8)**

b. Draw basic block diagram of earth station receiver and explain its working. **(8)**

Q.8 a. Briefly discuss about INSAT I and INSAT II. **(8)**

b. Explain working of telephone services via satellite with help of suitable sketch? **(8)**

Q.9 Write short notes on (any **TWO**) **(2×8=16)**

(i) IMARSAT.
(ii) Network architecture of CATV.
(iii) Altitude and orbit control.