

M.TECH/ECE/2ND SEM /ECEN 5241/2016

- (vi) Molniya orbits have periods of
(a) 24 hrs. (b) 6 hrs. (c) 12 hrs. (d) 8 hrs.
- (vii) G/T ratio of Earth Stations depend on
(a) quality of receiving earth station (b) LNA
(c) antenna (d) none of these
- (viii) DTH dishes are examples of
(a) Cassegrain antenna
(b) Primary-focus feed type antenna
(c) C-band antenna
(d) none of these
- (ix) In the G/T ratio, T stands for the temperature of receiver in:
(a) Fahrenheit; (b) Celsius;
(c) absolute scale; (d) none of these.
- (x) Gateway stations are
(a) receive only stations
(b) interface between satellite and terrestrial network
(c) used by telephone network only
(d) interconnection with GPS

Group - B

2. (a) What are the typical frequency bands used in Satellite Communication?
Why uplink frequency is kept higher than downlink?
- (b) What are the advantages of Satellite network over terrestrial network?
- (c) Explain, with a diagram, the concept of coverage angle.
 $(3+3) + 4 + 2 = 12$
3. (a) With the help of a suitable diagram, explain how azimuth and elevation angles are calculated and how it helps to locate a satellite.
- (b) What do you understand by attitude and orbital control? Explain how these parameters are achieved from the ground control.
 $5 + (2+5) = 12$

M.TECH/ECE/2ND SEM /ECEN 5241/2016

Group - C

4. (a) With a block schematic diagram, explain the functions of down-converter in a sitcom network. What are the design essentials?
- (b) Derive an expression for G/T ratio of earth station from basic assumption.
- (c) What are the uptime target for downlink and what is the second criteria?
 $(3+2) + 5 + 2 = 12$
5. (a) Explain the concepts of 'transponder hopping' and 'polarization hopping'. What are the main advantages of both?
- (b) How do you compute attenuation of EM signal due to rain? What are the main parameters in the formula?
 $(3+3+2) + (2+2) = 12$

Group - D

6. (a) Explain how inter modulation product are created in FDMA and how this can be controlled.
- (b) What are the major propagation effects in Satellite link?
- (c) What are the various payloads in a satellite?
 $(3+2) + 4 + 3 = 12$
7. (a) Explain the concept of SCPC/DAMA system.
- (b) What do you understand by DAMA? What are the types of demand assignment and characteristics?
 $4 + (2+3+3) = 12$

Group - E

8. (a) With a suitable diagram, explain the principle of operation of Direct broadcast Satellite system.
- (b) What is a Global Positioning System? How is this used to fix co-ordinates?
 $6 + 6 = 12$

M.TECH/ECE/2ND SEM /ECEN 5241/2016

9. (a) Explain, with a suitable diagram, the principles of operation of VSAT. What frequency band is used?
- (b) With a schematic diagram, highlight the operation of a MSAT network.
- (c) Mention Kepler's second law for satellite orbits.

(4+1) +5 +2 = 12

**M.TECH/ECE/2ND SEM /ECEN 5241/2016
2016**

**SATELLITE COMMUNICATION
(ECEN 5241)**

Time Allotted : 3 hrs

Full Marks : 70

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

**Group - A
(Multiple Choice Type Questions)**

1. Choose the correct alternatives for the following: **10 × 1=10**
- (i) For a satellite moving in a elliptical orbit with major axis of 42000 km and perigee of 8000 km, apogee is
(a) 34240 km (b) 35000 km
(c) 50000 km (d) 34000 km
- (ii) The point of intersection of satellite's orbital plane and equatorial plane where the satellite enters the northern hemisphere into southern hemisphere is called
(a) Ascending node (b) Perigee
(c) apogee (d) descending node
- (iii) The carrier to noise ratio for a satellite depends upon
(a) effective Isotropic radiated power (b) bandwidth
(c) free space path losses (d) all of them
- (iv) GPS system consists of x numbers of satellites where x stands for
(a) 24 (b) 48 (c) 12 (d) 3
- (v) The satellite subsystem that monitors and controls the satellite is the
(a) propulsion subsystem
(b) power subsystem
(c) communications subsystem
(d) telemetry, tracking & command