UKA TARSADIA UNIVERSITY

Integrated M.Sc. (IT) (Semester 5)
060010506(2013-14)
Satellite Communications

Date :05/06/2017 **Time :**1:30PM- 4:30PM
Max. Marks:60

Instructions :

1. Attempt all questions.
2. Write each section in a separate answer book.
3. Make suitable assumptions wherever necessary.
4. Draw diagrams/figures whenever necessary.
5. Figures to the right indicate full marks allocated to that question.
6. Follow usual meaning of notations/abbreviations.

SECTION - 1

Q 1 A) Answer the following. **[4]**

I) What is the equivalent degree E for Satellite at 89.5 degree W?

II) Define terms: a) prograde orbits, b) frequency reuse.

III) Which antenna is used to serve global beam pattern?

IV) Draw the figure of analemma.

Q 1 B) Answer the following in brief. (Any 3) **[6]**

I) Define satellite slot. How to measure satellite longitude and spacing?

II) Differentiate power generating subsystem and thermal control subsystem.

III) How elevation-azimuth mounts works?

IV) Write down the situation where geo transfer orbit is needed.

Q 2 Answer the following. **[10]**

A) Draw the schematic diagram of generic major satellite systems. Discuss the designing parameters like antennas, beam pattern, frequency, level of redundancy and battery power for satellite having life time of 1 year only and which will remain in Clarke's orbit.

OR

A) Which satellite structure can be used for smaller satellites which generate less heat and why? Discuss other subsystems like antenna, communication and power subsystems for this kind of satellite.

B) List out the issues in antenna pointing and provide solutions for the same.

OR

B) Draw the simplified schematic diagram of a "bent-pipe" transponder. Write short note on earth stations.

Q 3 Answer the following in detail. (Any 2) **[10]**

I) What is a satellite footprint? Explain eclipses in Clarke's orbit.

II) Write and explain three Kepler's law. How they are useful for satellite communication?

III) Explain how Molniya orbit satellites overcome the disadvantages of GSO satellites.

SECTION - 2

Q 4 A) Answer the following. **[4]**

I) Write the name of solid water available in atmosphere.

II) What is the name of satellite's angle above the horizon, used for pointing a dish?

III) TDMA is also referred as frequency reuse. True or false? Justify.

IV) What is data collision in the context of TDMA?

Q 4 B) Answer the following in brief. (Any 3) **[6]**

I) Calculate figure of merit for noise temperature 45 dB and gain of receiving dish is 60 dB. Define the terms. a) illumination level and b) power flux density.

II) Define: SPADE. How it works?

III) What is contention and polling in the context of demand assignment scheme?

IV) What is “triple whammy” effect? How it can be used to measure signal quality?

Q 5 Answer the following. **[10]**

A) Differentiate receive only earth stations, two-way earth stations and large earth stations.

OR

A) List out the components of link budget calculation and show one sample link budget calculation.

B) How scattering and scintillation affect the signal? How to improve quality of a degraded satellite link?List out any six climate types defined by Crane model.

OR

B) How elevation angle and path length affect the signal strength?

Q 6 Answer the following in detail. (Any 2) **[10]**

I) Explain private satellite operators in detail.

II) List out methods for allowing multiple uses to use single satellite. Explain FDMA in detail.

III) List out any four major telecommunications and satellite issues and explain any two in detail.