



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(ECE)/SEM-2/MCE-205A/2013

2013

SATELLITE COMMUNICATION

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

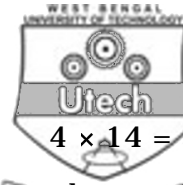
*Candidates are required to give their answers in their own words
as far as practicable.*

1. Answer *all* questions : $7 \times 2 = 14$

- i) What are the two angles used to point a ground station antenna ?
- ii) Why intermodulation products is important in FDMA system ?
- iii) Explain what is Effective Isotropic Radiated Power (EIRP).
- iv) Justify spot beam antenna is a better choice than earth coverage antenna.
- v) Justify Klystron amplifier is better in performance compared to TWTA but bandwidth is very poor.
- vi) Justify in frequency reuse orthogonal polarization can be applied.
- vii) Justify in a TDMA system carrier and clock recovery sequence regenerates the bit timing clock for data demodulation.

30195 (M.Tech)

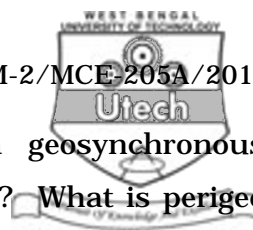
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4 × 14 = 56

Answer any *four* of the following.

2. a) Draw a neat block diagram showing the typical architecture of satellite earth station.
b) Explain with a neat diagram the operation of a TWTA used in satellite earth station.
c) Discuss briefly the redundancy configuration employed in TWTA in earth station. 3 + 8 + 3
3. a) What is the difference between FDM and FDMA ?
b) For a FDM-FM-FDMA system derive necessary steps to find the expression for $C/N = (S/N) (b/B) (f_m/f_r)^2$. Where S, N, b, B, f_m and f_r have their respective meaning. 4 + 10
4. a) What is meant by frequency reuse ? 2
b) With a schematic block diagram discuss the frequency reuse technique used in satellite communication system using multichannel multi-beam satellite transponder. What are its advantages ? 9 + 3
5. a) Draw the block diagram of a typical communication subsystem of a satellite. 4
b) Why uplink frequency is greater than the downlink frequency ? What is the footprint of a satellite ? What is spot beam antennas ? 3 + 2 + 2
c) Calculate the power gain of a parabolic reflector antenna with a mouth diameter of 10 m at 6 GHz assumes antenna aperture efficiency to be 80%. 3



6. a) What is the difference between a geosynchronous satellite and a geostationary satellite ? What is perigee of a satellite ? 2 + 1
- b) Explain with diagram the sun transit outage of a satellite signal. 4
- c) From basic transmission theory, find out the link equation; hence point out terms EIRP and free space path loss in dB form. 7
7. a) What is the full form of LNBC ? Explain its function with block diagram. 1 + 2
- b) Explain atmospheric effects on satellite communication link. 6
- c) State features and application of VSAT. 3
- d) Explain rain attenuation of satellite communication system. 2
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