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EC 1317 E 013

Roll No. of candidate

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2018

B.Tech. 7th Semester End-Term Examination
SATELLITE COMMUNICATION AND REMOTE
SENSING

(Elective - I)

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *six* from the rest.

(10 × 1 = 10)

1. (i) State Kepler's First Law.
(ii) Define Apogee.
(iii) What is the sun transit outage?
(iv) What is an EIRP?
(v) What is sky noise?
(vi) Define guard time.
(vii) Mention the earth segment.
(viii) What is the direct broadcasting satellite?
(ix) Name some navigation system used in satellite.
(x) What is transponder?

[Turn over

Answer any Six from the following:

(6 × 15 = 90)

2. (a) Explain about frequency allocations for satellite services? (5)
- (b) India's first experimental satellite Aryabhata had low earth elliptical orbit with semi major axis of 6969 km and eccentricity of 0.00402. Find the apogee and perigee heights of the satellite. (5)
- (c) Describe the velocity of a satellite. (5)
3. (a) Explain Solar time and sidereal time? (5)
- (b) How are the satellite orbits classified? (5)
- (c) What are the applications of GEO satellite? (5)
4. (a) Find the orbital radius of the geostationary orbit. (Assume the radius of earth to be 6378 km) (5)
- (b) Which are the major sub-systems of a satellite communication?
- (c) The power amplifier of a satellite has MTBF of 50,000 hr. Find the
- (i) Failure Rate of the amplifier
- (ii) Reliability at the end of 1 year and 5 years.
5. (a) How are the TT & C sub systems distributed between satellite and ground station? Explain with diagrams? (7)
- (b) A Geostationary satellite transmits signals in Ku-band, at 11.2 GHz, on the downlink with circular aperture antenna. The efficiency of the antenna is 62%. The gain of the antenna is 45 dB. Find the beam width of the antenna. (5)
- (c) What are the functions of an earth station? What are the different types of earth station? (3)
- (a) An earth station has antenna of 13 m diameter with the efficiency of 55% and transmits 14 GHz signal to a satellite in geostationary orbit. Find the EIRP of the antenna if the transmitted power is low. (5)
- (b) What factors cause signal degradation in the atmosphere? (5)
- (c) What is scintillation, and how and when does it occur? (5)
- (a) What is meant by uplink and downlink? Explain. Write the link equation? (4 + 2 = 6)
- (b) An earth station transmits 20 W signal at 6 GHz in 36 MHz bandwidth in the uplink to a satellite in a geostationary orbit. The EIRP of the earth station is 53 dBW. If the satellite G/T is 16 dB/k. Find the received C/N at the satellite. Find the receive power at the earth station receiver if the satellite has an EIRP of 42 dBW and transmits at 4 GHz. (9)
- (a) Why TDM data rate is always higher than the aggregate rate of all the input data? (4)
- (b) Why FM is preferred modulation in analog satellite communication system? (5)
- (c) Why coding is necessary in satellite communication? (3)
- (d) What is convolutional codes? Write its advantages? (3)

9. (a) Define Remote sensing? Give examples. (3)
- (b) What are the frequency band used in satellite navigation system? (2)
- (c) Which are the satellite based navigation systems other than GPS? Explain. (5)
- (d) What are the applications of satellite navigation system? (5)
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