

R18

Code No: 158CM

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year II Semester Examinations, July/August - 2022

**(SATELLITE COMMUNICATIONS
(Electronics and Communication Engineering))**

Time: 3 Hours

Max.Marks:75

**Answer any five questions
All questions carry equal marks**

- 1.a) Explain in detail about Orbital perturbations.
- b) A satellite is orbiting in a GEO of radius from the center of the earth is 41500 Kms. Find the velocity and time of the Orbit of the satellite. What will be the change in velocity if the radius reduces to 36000Kms. if $\mu = 3.98 \times 10^5 \text{ Km}^3/\text{s}^2$ [9+6]
- 2.a) Define the terms: i) Ascending node
 ii) Synchronous orbit
 iii) Angle of inclination.
- b) Define look angles and derive the expressions for the elevation and azimuth angles. [6+9]
- 3.a) Derive the expressions for the system noise temperature, noise figure and G/T ratio of an Earth station receiver.
- b) Calculate the system noise temperature of a 4 GHz receiver having the following gains and noise temperatures. $T_{in}=25 \text{ K}$, $T_{RF}=50 \text{ K}$, $T_M=500 \text{ K}$, $T_{IF}=1000 \text{ K}$, $G_{RF} = 23 \text{ dB}$, $G_m=0 \text{ dB}$ and $G_{IF} = 30 \text{ dB}$. [10+5]
- 4.a) Explain Telemetry, Tracking and command subsystem of satellite with neat diagrams.
- b) How signal is acquired in satellites with respect to GPS? [10+5]
- 5.a) Distinguish the terms multiplexing and multiple Access. Give the calculation procedure of C/N ratio.
- b) What is Inter modulation in FDMA? [10+5]
- 6.a) Explain TDMA frame structure.
- b) What are the different types of demand assignment multiple Access characteristics? [8+7]
- 7.a) Draw the transmitter block diagram of an earth station and explain its working.
- b) A satellite at a distance of 36,000 km from earth radiates a power of 5 W from an antenna with a gain of 15 dB. Find the power received by an antenna at the earth station with a diameter of 4 m. The loss due to atmosphere is 2 dB and the operating frequency is 10 GHz. [9+6]
- 8.a) Discuss delay and throughput considerations of satellite system.
- b) What are the advantages of LEO satellites comparing geostationary satellites? [8+7]

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