Roll No.												

PRESIDENCY UNIVERSITY
BENGALURU

School of Engineering

Mid - Term Examinations - November2024

Semester: VII | **Date**: 06/11/2024

Course Code: ECE3055 | **Time**: 11:45am – 1:15pm

Course Name: Satellite Communication | **Max Marks**: 50

Program: Electronics & Communication Engineering | **Weightage**: 25%

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Qx2M =10M**

1	Each satellite is equipped with the transmitter to transmit and and receive the signals from and to the earth station and the space station.The transmitter-receiver combination in the satellite is known as a _____	2 Marks	L1	CO1
2	Noise figure gives the details about the overall system noise temperature .Write an equation for the overall system noise temperature T_s.	2 Marks	L1	CO1
3	Atmospheric drag is one of the orbital perturbation.The effects of atmospheric drag are significant for near-earth satellites, below about…….KM	2 Marks	L1	CO1
4	We have many points defined on the axis of the satellite such as Apogee,Perigee,barycenter,epicenter etc . The point of farthest approach to earth is termed as ---------	2 Marks	L1	CO2
5	Resistive attenuators, transmission lines, and waveguides are all examples of absorptive networks.Define Absorptive networks.	2 Marks	L1	CO2

Part B

Answer ALL Questions. Each question carries 10 marks. **4QX10M=40M**

6	6a.	Orbital parameters are the factors used for measuring the performance of the satellite in terms of angle,precision ,angle,etc. in its orbit.There also exist many phenomenons	5 Marks	L2	CO1

		which disturbs the communication of satellites.Define the following a)Perigee b)apogee c)semi minor axis			
	6b.	The semi major axis of the two satellites are 45000KM and 7000KM of satellite 1and satellite 2 respectively.Determine the relationship between their orbital period1 and orbital period 2 explain it.	5 Marks	L3	CO1
		Or			
7	7a.	three laws of Johannes Kepler derived empirically describes about the planetary motion. Kepler's laws apply quite generally to any two bodies in space which interact through gravitation .State and explain the three kepler's laws related to satellites.	5 Marks	L2	CO1
	7b.	A satellite is moving in an elliptical orbit with the major axis =52000 KM.If the perigee distance is 10000KM.Find the Apogee and the orbit eccentricity.	5 Marks	L3	CO1
8		CNR ratio should be maximum for the communication to be efficient .The carrier to noise ratio defines the efficiency parameters of uplink and downlink of the satellite.Derive the CNR with the essential explanation for both uplink and downlink.	10Marks	L3	CO2
		Or			
9		One uplink plus downlink forms the one link of calculation.Link budget is actually the sum of all the losses between: Transmitter - Satellite & back down to a Receiver. With the required diagram and necessary equation explain the Basic link analysis to derive Friis transmission equation.	10 Marks	L3	CO2
10	10a.	The satellite moves in a path called orbit.Orbits are classified based on different parameters.write and explain the classification of the satellites based on its height.	5Marks	L1	CO1
	10b	A satellite is orbiting Earth in a uniform circular orbit at a height of 630KM from the surface of Earth.Assuming the radius of Earth and its mass to be 6370KM and 5.98×10^{24} kg respectively,Determine the velocity of the satellite (Take the gravitational constant G=6.67X10^{11}Nm2/Kg2	5Marks	L2	CO1

Or

11	11a.	Satellite is meant for the transmission and reception of the signals and it provides wide coverage area .With a block diagram explain the working of a satellite.	5Marks	L1	CO1
	11b.	A system consists of $T_{ant,}$Lossy cable,Amplifier with the receiver noise figure is 12 dB, the cable loss is 5 dB, the LNA gain is 50 dB, and its noise temperature 150 K. The antenna noise temperature is 35 K. Calculate the noise temperature referred to the input.	5Marks	L2	CO1
12	12a.	Amplifiers in cascade determine the overall noise temperature . A 12 GHz receiver consists of an RF stage with gain G1 = 30 dB and noise temperature T1 = 20 K, a down converter with gain G2 = 10 dB and noise temperature T2 = 360 K and an IF amplifier stage with gain G3 = 15 dB and noise temperature T3 = 1000 K. Calculate the effective noise temperature and noise figure of the system. Take the reference temperature to be 290 K. Also find the overall noise figure by calculating the individual noise figures of the stages mentioned	7Marks	L1	CO2
	12b.	The antenna system is subjected to many noises in which thermal noise contributes majorly.Write a short note on overall system noise temperature.	3Marks	L2	CO2

Or

13	13a.	Transmission losses of the satellite play a very important role in deciding the factors of efficiency in the link of transmission and reception of the signals.Name and Explain in details all the types of transmission losses of the satellite.	7 Marks	L1	CO2
	13b.	Orbital parameters are the factors used for measuring the performance of the satellite in terms of angle,precision ,angle,etc. in its orbit.Define semi major axis.	3Marks	L2	CO2