Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 09- 12-2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program :**B. Tech	
Course Code : ECE3055	**Course Name:** Satellite Communication	
Semester: VII	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	7	8	5	20	40	40

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. **10Q x 2M=20M**

1.	The orbital perturbations are the disturbances created in the links of satellite. Define the term Atmospheric Drag.	**2 Marks**	**L2**	**CO2**
2.	The different satellite services are used for different application based on their frequencies. Name the different types of satellite services available in satellite communication.	**2 Marks**	**L2**	**CO1**
3.	The different bands of frequencies in satellite communication exist which are used for different application.---------band of frequencies are used exclusively for military applications.	**2 Marks**	**L2**	**CO1**
4.	Attitude of a satellite refers to orientation of a satellite in space. Name the types of Attitude control techniques.	**2 Marks**	**L2**	**CO2**
5.	GLONASS is a application which uses a constellation of ---------number of satellites. Expand the acronym GLONASS.	**2 Marks**	**L2**	**CO5**
6.	Orbital period of a satellite gives information about the time taken by the satellite to complete one rotation. Calculate the orbital period of a satellite moving in an elliptical orbit having a major axis of 60,000km.Take $\mu=39.8X10^{13}Nm^2/Kg$.	**2 Marks**	**L2**	**CO3**

7.	CDMA and FDMA are the two efficient methods of multiple access used for data communication. Bring out 4 differences between CDMA and FDMA.	**2 Marks**	**L2**	**CO5**
8.	All the losses in Link budget calculation helps in finding the most efficient path of the signal .Write an equation for the total losses for clear sky condition .	**2 Marks**	**L2**	**CO4**
9.	Noise temperature of a network is a very important factor which helps in determining the efficiency of the network. Define and briefly explain about the noise temperature of absorptive network.	**2 Marks**	**L2**	**CO4**
10.	The GSM has many air interface that provides link between link layer and the network layer. Explain the function of BCCH air interface in GSM.	**2 Marks**	**L2**	**CO5**

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	The satellite services in satellite communication are used for different applications. Explain in detail the three groups of satellite services .	**05 Marks**	**L2**	**CO1**
	b.	A satellite is moving in an elliptical orbit with the major axis equal to 42 000 km. If the perigee distance is 8000 km, find the apogee and the orbit eccentricity. Also Determine the relationship between their orbital periods if the semi-major axes of the two satellites are given as 27000 km (satellite 1) and 54 000 km (satellite 2).	**05 Marks**	**L3**	**CO1**
		Or			
12.	**a.**	Launch vehicles are used to launch or place the satellites into its orbit. Write a short note on propulsion and launch vehicles of the satellites.	**05 Marks**	**L2**	**CO1**
	b.	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.	**05 Marks**	**L3**	**CO1**

13.	**a.**	Carrier to noise ratio is defined as the ratio of carrier signal to the noise of the system .Derive the CNR of an uplink and downlink of a satellite.	**10 Marks**	**L3**	**CO3**
		Or			

14.	**a.**	Amplifiers in cascade determine the overall noise temperature . A 24 GHz receiver consists of an RF stage with gain G1 = 60 dB and noise temperature T1 = 80 K, a down converter with gain G2 = 50 dB and noise temperature T2 = 520 K and an IF amplifier stage with gain G3 = 35 dB and noise temperature T3 = 1080 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 .	**10 Marks**	**L3**	**CO3**

15.	**a.**	The tracking, telemetry and command (TT&C) subsystem monitors and controls the satellite right from the lift-off stage to the end of its operational life in space. With a neat block diagram give a detailed explanation about TT&C operation.	**10 Marks**	**L4**	**CO4**
		Or			
16.	**a.**	Depending on the usage of transponder channels the satellite acess methods are classified .Name the classification of satellite acess methods .Explain in detail with the necessary block diagrams the SPADE communication system or the SPADE system.	**10 Marks**	**L4**	**CO4**

17.	**a.**	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 with the help of FRISS TRANSMISSION FORMULA.A lso explain the basic link analysis with the neat block diagram .	**15 Marks**	**L3**	**CO6**
		Or			
18.	**a.**	TDMA uses reference station for Burst synchronization.Explain in detail the frame structure with the necessary diagrams.Explain the basic equipment block of TDMA with relevant diagram.Explain the carrier recovery circuit of TDMA with the relevant diagram.	**15 Marks**	**L3**	**CO6**

19.	**a.**	Global system for Mobile (GSM) is a second generation cellular standard developed to cater the voice and data services using digital modulation .Explain in detail the architecture of GSM with necessary block diagram.State the applications of GSM.	**15 Marks**	**L3**	**CO6**
		Or			
20.	**a.**	Johannes Kepler derived empirically three laws describing 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.Explain	**15 Marks**	**L3**	**CO6**

		the process of CDMA(code division multiple access)with transmitter and receiver block diagrams.			

21.	**a.**	Orbital Perturbations are defined as the disturbances caused in the movement of the satellites in its orbit.Bring out the detailed explained about orbital perturbation and its types.	**10 Marks**	**L2**	**CO3**
	b.	Transmission Losses are defined as the losses that occur in the received signal during transmission of the signal between earth station and space station .Explain in detail all the types of transmission loses .	**10 Marks**	**L3**	**CO5**
		Or			
22.	**a.**	The global navigation satellite system is effective and efficient in providing the real time positioning and timing services. Elucidate in detail the working principle of Global positioning system enclosing the details of different segments included in operation of GPS.	**10 Marks**	**L3**	**CO5**
	b.	Station keeping is a method followed to keep the satellites in its orbit.Explain in detail what is maneuvers with the types of Station Keeping maneuvers and and the steps followed to overcome the maneuvers.	**10 Marks**	**L2**	**CO3**