

Reg. No.:

Name :



Continuous Assessment Test – I – August 2024

Programme	: B.Tech (ECE)	Semester	: Fall 2024-25
Course	: Satellite Communication	Code	: BECE310L
		Slot	: B1+TB1
Faculty	: Dr. Niraj Kumar Prof. J. Divya	Class Nbr(s)	: CH2024250100027 CH2024250100147
Time	: 90 Minutes	Max. Marks	: 50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer ALL the questions

Q.No.	Sub. Sec.	Question Description	Marks	Blooms Taxonomy Level
1.	(a)	What are the orbital elements in satellite system and how does it affect the performance of satellite communication systems?	[4]	L1
	(b)	A satellite is in an elliptical orbit with a perigee of 1500 Km and apogee of 5000 Km. Using a mean earth radius of 6378.14 Km, find the period of the orbit in hours minutes and seconds and the eccentricity of the orbit.	[6]	L1
2.		An earth station is situated in Paris, need to calculate the satellite longitude and elevation angle in geostationary orbit. Following information are provided: Earth station latitude and longitude are 50° N and 0° E Azimuth angle is 113.86° and satellite is SE to the earth station. Calculate the elevation angle and subsatellite longitude and determine whether satellite is visible from the earth station.	[10]	L2
3.		A low earth orbit satellite is in circular polar orbit with an altitude h, of 1100 km. A transmitter on satellite has a frequency of 3 GHz, Find (i) The velocity of the satellite in the orbit (ii) The component of velocity towards an observer at the earth station as the satellite appears over the horizon, for an observer who is in the plane of the satellite orbit. (iii) Find the Doppler shift of the received signal at the earth station. Use a mean earth radius value, r_e of 6378 km.	[10]	L4
4.		Describe the tracking, telemetry, command and monitoring (TTC&M) facilities of a satellite communications system along with block diagram.	[10]	L2
5.		The state of Chattisgarh subtends an angle of approximately $9^\circ \times 3^\circ$ when viewed from geostationary orbit.	[10]	L3

		(i) What dimension must a reflector antenna have to illuminate one third of this area with a circular beam 3° in diameter at 4 GHz? (ii) Can a reflector be used to produce a $9^\circ \times 3^\circ$ beam? (iii) What gain would the antenna have for both the above cases? (iv) What is antenna efficiency in percentage?		
		Total Marks	[50]	

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