Reg. No.:

Name :

VIT CHENNAI
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test – I – August 2024

Programme	:	**B.Tech (ECE)**	Semester	:	**Fall 2024-25**
Course	:	**Satellite Communication**	Code	:	**BECE310L**
			Slot	:	**B2+TB2**
Faculty	:	**Dr. Niraj Kumar** **Prof. J. Divya**	Class Nbr(s)	:	**CH2024250100148** **CH2024250100149**
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.		An earth observation satellite is placed in a circular equatorial orbit, so that it moves in the same direction as the earth's rotation. Once every six hours, the satellite is directly above the controlling earth station which is located on the equator. Assuming earth's rotational period as exactly 24 hours, Kepler's constant 3.986004418×10^5 Km^3/s^2 and earth's radius 6378.137 Km, Find the below listed parameters. (a) The orbital time period in hours, minutes and seconds. (b) The orbital radius in Km. (c) The orbital height in Km. (d) Satellite's angular velocity in radians per second. (e) Satellite's linear velocity in meters per second.	**[10]**	**L2**
2.		An earth station situated in Dehradun, India, needs to calculate look angles of the geostationary satellite (GSAT-11) operated by ISRO. The details of the earth station site and the satellite are as follows: Earth station latitude and longitude are 38°N and 78°E Satellite longitude (subsatellite point) is 74°E Calculate the elevation and azimuth angle and determine whether satellite is visible from the earth station.	**[10]**	**L3**
3.		Describe the various orbital effects on communication system performances.	**[10]**	**L1**
4.		Explain the single conversion and double conversion transponder with block diagrams. When is double conversion transponder preferred over single conversion transponder?	**[10]**	**L2**

5.		A direct broadcast TV satellite requires 500 W of electrical power to operate the housekeeping functions of the satellite and 4 kW to operate its 12 high power transponders. The longest duration of an eclipse is 70 min during which time battery provides the required power to keep the satellite operating, but the battery must not discharge below 80 % of their capacity. The battery pack provides voltage of 48 V. (a) What is the current required to operate the communication system of the satellite? (b) What is the required battery capacity (in AH)? (c) If every AH of battery has weight of 1.2 Kg, what will be the total weight of the battery. (d) If the allowed weight of the battery is 120 Kg, how many transponders need to switch off during eclipse to meet the weight criteria.	**[10]**	**L4**
		Total Marks	**[50]**	

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