BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: **B.Tech** **SEMESTER : 7th**
BRANCH: **ECE** **SESSION : MO/2025**

SUBJECT: EC417 SATELLITE COMMUNICATION

TIME: **02 Hours** **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	What is the basic difference between i) geo stationary and geo synchronous orbit. Ii) ascending and descending node.	[2]	1	2
Q.1(b)	A satellite moving is orbiting in the equatorial plane with a period from period from perigee to perigee of 12hrs. Given the eccentricity is 0.02. Calculate the semi-major axis.(in km) The earth's equatorial radius **is 6378.1414 km.($\mu=3.986005\times10^5 km^3/s^2$)**	[3]	3	3
Q.2(a)	Find the viewing angle(El)having orbital radius **42164km** of a geostationary satellite having earth radius **42000km** from an earth station making an central angle of **25 degrees.**	[2]	3	3
Q.2(b)	Explain in brief (steps) how a satellite is placed in geostationary orbit?	[3]	1	3
Q.3(a)	i) A satellite downlink at 12 GHz operates with a transmit power of 6W and an antenna gain of **48. 2dB**.Calculate the EIRP in **dBW.** ii) The range between a ground station and a satellite is **42000** km. Calculate the free space loss a frequency of 6 GHz.	[2]	3	4
Q.3(b)	Derive the expression for link equation used for calculation of power received in any radio link.	[3]	3	3
Q.4(a)	An Amplifier(LNA) has noise figure of **3.5dB.** What is equivalent noise temperature?	[2]	3	3
Q.4(b)	Derive the expression for equivalent noise temperature using noise model .	[3]	3	4
Q.5(a)	What is **G/T ratio** in satellite Communication? How this ratio can be improved?	[2]	3	2
Q.5(b)	What is link budget? Explain in brief .Write down the frequency band(with range) used in satellite communication.	[3]	3	3

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