

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

**CLASS: MTECH
BRANCH: ECE**

**SEMESTER : I
SESSION : MO/19**

SUBJECT: EC517 SATELLITE BASED WIRELESS COMMUNICATION

TIME: 3.00Hrs.

FULL MARKS: 50

INSTRUCTIONS:

1. 1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) With the help of suitable diagram, show the process of placing the Satellite in the geostationary orbit. [5]
A satellite moving in a highly eccentric Molniya orbit having the farthest and the closest points as 35,000 km. and 500 km. respectively from the surface of the earth. Determine the orbital time period and the velocity at the apogee and the perigee points.
- Q.1(b) How the Satellite communication is affected during the occurrence of Eclipse? Determine the maximum shadow angle and maximum daily eclipse duration occurring at equinoxes for a geostationary satellite. [5]
- Q.2(a) Applying the link budget equation, discuss the effects of various losses on received power. [5]
- Q.2(b) Consider the transmitting antenna of a geostationary satellite fed with a power P_T of 10 W, at a frequency 12 GHz, and radiating this power in a beamwidth Θ_{3dB} equal to 2° . An earth station equipped with a 4 m diameter antenna is located on the axis of the antenna at a distance of 40,000 km from the satellite. The efficiency of the satellite antenna is assumed to be 0.55 and that of earth station as 0.6. Determine the power radiated by the ground station antenna in Watts. [5]
- Q.3(a) Discuss the TDMA frame structure. How the TDMA frame efficiency is calculated and optimized? [5]
- Q.3(b) Discuss the role of efficient techniques in satellite Communication. What are the advantages of Digital Speech interpolation (DSI)? [5]
- Q.4(a) Discuss the necessity of multi-beam satellite communication and compare it with single beam satellite communication. [5]
- Q.4(b) Illustrate the switch state sequence during the active part of the traffic field for a three-beam SS-TDMA satellite. [5]
- Q.5(a) Demonstrate the role of INMARSAT in satellite communication with the help of suitable diagram. [5]
- Q.5(b) Discuss the various requirements of the VSAT network and its network topologies. [5]

:::06/12/2019E:::