

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

**CLASS: BTECH
BRANCH: ECE**

**SEMESTER : VII
SESSION : MO/2022**

SUBJECT: EC419 SATELLITE COMMUNICATION

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:

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.

		CO	BL
Q.1(a) Find the exact altitude of GPS satellite that has an orbital period equal to one half of the sidereal day length of 23 hours,56 minutes and 4.1seconds.Use a mean value of earth radius $r_e=6378.14\text{Km}$.	[2]	I	II
Q.1(b) Why uplink frequency is higher than downlink frequency? What are the functions of earth station?	[3]	II	III
Q.1(c) Mention the name of launch vehicles and explain the different ways for placing satellite into Geostationary orbit.(In brief)	[5]	III	II
Q.2(a) What do you mean by G/T Ratio for Earth Stations?	[2]	I	II
Q.2(b) A satellite carries a transponder with a transmitter at 4 GHz. The transmitter is operated at an output power of 10 watts and drives an antenna with a gain of 30 dB. An earth station is at the center of the coverage zone of the satellite, at a range of 38,500 km. Using decibels for all calculations, find: i)The flux density at the earth station in dBW/m^2 . ii)The power received by an antenna with a gain of 39 dB, in dBW.	[3]	III	IV
Q.2(c) What do you mean by link budget in satellite communication ?Why and how is it used?	[5]	III	IV
Q.3(a) What are the major subsystem required on the satellite(Name only).?What are the types of transponder used in Communication Sub system?	[2]	I	II
Q.3(b) What are the basic requirements for earth station Antenna.?Name the antennas used for earth antenna. Explain any one of them.	[3]	II	III
Q.3(c) Mention the need to calculate reliability of a satellite subsystem? State Reliability theory. Prove that reliability of a device decreases with time.	[5]	III	V
Q.4(a) Compare SCPC with MCPC	[2]	IV	V
Q.4(b) A TDMA network of 6 earth stations shares a single transponder equally.The frame duration is 2.0ms with data burst duration 380micro second. If transmitted data rate for the packet is 390kbps and maximum possible bit rate at any one earth station is 80Mbps.Calculate no of packets carried by earth station.	[3]	IV	V
Q.4(c) Describe DSI and SPADE used in satellite network?. Does it increases satellite capacity?	[5]	V	IV
Q.5(a) What are the major types of Intelsat? What frequency does Intelsat use?	[2]	II	II
Q.5(b) Discuss GPS position location principles used in Satellite navigation system.	[3]	III	III
Q.5(c) Which technology is used in VSAT? What is the size of a VSAT antenna and frequency band used in VSAT? Explain the type of network configuration used in VSAT?(With suitable diagram)	[5]	V	V