GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
SATELLITE AND SPACE COMMUNICATION
MCE203B

TIME ALLOTTED: 3 Hrs **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **10×1=10**

		Marks	CO No
1. (i)	GPS stands for a) Global Positioning System b) Geo Position System c) Guide Posting System d) Global pointing System	1	CO3
(ii)	Which of the following are the examples of natural satellites? a) Sun b) Moon c) Planet d) all of the above	1	CO2
(iii)	After the up-linking process, a satellite _____ and _____ the signal. a) Receives, amplifies b) Amplifies, receives c) Receives, adds noise d) Adds noise and transmits	1	CO3
(iv)	Which of the following are the components in satellite communication? a) Mixer b) Transponder c) Filter d) All the above	1	CO4
(v)	Which of the following are the advantages of FDMA? a) It is easy to implement b) It is a continuous transmission scheme c) Less complex scheme d) All the above	1	CO3

(vi)	What is the maximum distance covered by satellite communication? a) 1300 km b) 1500 km c) 1800 km d) 1100 km	1	CO1
(vii)	Is a loss of power of a satellite downlink signal due to earth's atmosphere? a) Atmospheric loss b) Path loss c) Radiation loss d) RFI	1	CO3
(viii)	As the height of a satellite orbit gets lower, the speed of the satellite a) Increases b) Decreases c) Remains the same d) None of the above	1	CO2
(ix)	A satellite signal transmitted from a satellite transponder to earth's station. a) Uplink b) Downlink c) Terrestrial d) Earthbound	1	CO3
(x)	What is the delay time for satellite transmission from earth transmitter to earth receiver? a) 0.5 s b) 1.0 s c) 5 ms d) 0.25 ms	1	CO2
(xi)	The earth area covered by a satellite radio beam. a) Beamwidth b) Bandwidth c) Footprint d) Zone	1	CO4
(xii)	Point on the satellite obits closest to the earth. a) Apogee b) Perigee c) Prograde d) Zenith	1	CO1

GROUP – B
(Short Answer Type Questions)
(Answer any ***three*** of the following) **3 x 5 = 15**

		Marks	CO No
2. a)	Explain the characteristics of LEO, MEO, GEO.	3	CO1
b)	What are the different types of antenna mounts?	2	CO1
3.	Explain telemetry tracking and command system	5	CO4
4.	What is the difference between geosynchronous satellite and a geostationary satellite orbit? What is uplink and downlink?	5	CO2
5.	Derive the equation for the power received by an earth station from a satellite transmitter.	5	CO3
6.	Write short note on single conversion transponder.	5	CO4

GROUP – C
(Long Answer Type Questions)
(Answer any ***three*** of the following) **3 x 15 = 45**

		Marks	CO No.
7. a)	What are Kepler's three laws of planetary motion? Give the mathematical formulation of Kepler's third law of planetary motion.	7	CO1
b)	Derive C/N ratio using noise temperature. at the demodulator. Also calculate G/T ratio for earth station.	5	CO5
c)	A Satellite downlink at 12GHz operates with a transmit power of 6W and an antenna gain of 48.2dB. Calculate the EIRP in dBW.	3	CO3
8. a)	Explain the AOCS with the help of neat labelled diagram.	8	CO4
b)	Describe and write the equations of link-power budget	7	CO3
9. a)	What is basic transmission theory of a Satellite? Discuss about the	8	CO1
b)	A satellite at a distance of 40000km from a point on the earth's surface radiates a power of 10W from an antenna with a gain of 17dB in the direction of the observer. Find the flux density at the receiving point and the power received by an antenna at this point with an effective area of 10m2.	7	CO1
10.a)	Explain the frequency division multiple access of satellite system with one example.	8	CO2
b)	Explain the principle and architecture of satellite communication.	7	CO1
11.a)	Explain clearly about GEO satellite systems	5	CO2
b)	Write about future trends of satellite communications. Draw and explain the double conversion transponder for 14/11GHz band.	10	CO4