GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
SATELLITE & OPTICAL COMMUNICATION
EC701A

TIME ALLOTTED: 3Hours **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)	What happens if a satellite is launched vertically and released at its design altitude? a) Continue to orbit the earth b) Fall back c) Overshoots the altitude and moves at a constant speed d) Stays where it was released	1	CO1
	(ii)	Why does the orbit take the shape of an ellipse or circle? a) Position can be easily determined b) Consume less fuel c) Most efficient geometry d) Better coverage on earth	1	CO1
	(iii)	Multiple access schemes are used to allow _____ mobile users to share simultaneously a finite amount of radio spectrum. a) Many b) One c) Two d) Ten-Fifteen	1	CO2
	(iv)	Frequency division duplexing provides _____ distinct bands of frequencies for _____ user. a) Two, two b) One, two c) Two, one d) Two, many	1	CO2
	(v)	A helical antenna is used for satellite tracking because of _____ a) Circular polarization b) Maneuverability c) Beamwidth d) Gain	1	CO3
	(vi)	Repeaters inside communications satellites are known as _____ a) Transceivers b) Transponders c) Transducers d) TWT	1	CO3

(vii)	Low-Earth-orbit (LEO) satellites have _____ orbits. a) equatorial b) polar c) inclined d) none of the above	1	CO3
(viii)	Which kind of dispersion phenomenon gives rise to pulse spreading in single mode fibers? a) Intramodal b) Intermodal c) Material d) Group Velocity	1	CO2
(ix)	The signal from a satellite is normally aimed at a specific area called the _____. a) path b) effect c) footprint d) none of the above	1	CO3
(x)	There is (are) _____ orbit(s) for a GEO satellite. a) one b) two c) many d) none of the above	1	CO2
(xi)	The uplink..... a) The uplink of a satellite circuit is the one in which the earth station is transmitting the signal and the satellite is receiving it. b) The uplink of a satellite circuit is the one in which the earth station is receiving the signal and the satellite is transmitting it. c) signal transmission d) none of these	1	CO3
(xii)	Conditions are required for an orbit to be geostationary: a) The satellite must travel eastward at the same rotational speed as the earth. b) The orbit must be circular. c) The inclination of the orbit must be zero. d) all of these	1	CO3

GROUP – B
(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

		Marks	CO No
2.	Define the following terms:	5	CO2
3.	State the difference between step index and graded index fiber.	5	CO4
4.	Write down the difference between FDMA, TDMA and CDMA.	5	CO3
5.	Write down about Rain and ice effects in propagation.	5	CO3

6.		State the reason: Uplink frequency in satellite communication is different from downlink frequency.	5	CO3

GROUP – C
(Long Answer Type Questions)

Answer any ***three*** from the following: **3×15=45**

			Marks	CO No
7.	(a)	Explain with neat sketch double conversion satellite transponder for 14/11 band.	8	CO1
	(b)	Explain satellite link power budget design.	7	CO2
8.	(a)	Briefly explain propagation effects on satellite communication.	8	CO3
	(b)	A global beam satellite at GSO subtends 15 degrees angle. Assume it as theta 3-dB. What will be the satellite antenna diameter and gain at 10 GHz?	7	CO2
9.	(a)	Write down about Fiber to Fiber Joints-LED Coupling to Single Mode Fibbers-Fiber Splicing.	12	CO5
	(b)	What are the Optical Fiber connectors?	3	CO5
10.	(a)	What are Error detection and correction in satellite Communication?	10	CO2
	(b)	What is Convolution code?	5	CO3
11.		Write short notes on any three of the following:	3X5=15	
	(a)	Satellite Transponder	5	CO4
	(b)	MSAT network	5	CO1
	(c)	Worldwide timing by Satellite relay	5	CO2
	(d)	Classification of fiber optic cables	5	CO3
	(e)	Orbital mechanism	5	CO2