ii.	A satellite TV signal occupies 36MHz bandwidth and it must provide a C/N ratio at the destination earth station of 25dB (Downlink). Assume total transmission losses as 200dB, destination earth station G/T in 28 dB/K. Calculate the satellite EIRP required. Let [K] = 228.		4	3	2	4
30. a.	Describe the operation of TT&C subsystem and attitude control subsystem. Use sketches wherever necessary.		12	2	3	4
	(OR)					
b.	Demonstrate the working of indoor and outdoor unit of receive only home TV system with neat diagram.		12	2	3	3
31. a.	Discuss the functioning of Pre assigned TDMA with neat diagram. Give a note on demand assigned TDMA. (Time Division Multiple Access).		12	2	4	4
	(OR)					
b. i.	A Frequency – Division Multiple Access System has medium range message traffic. It uplinks 168 voice channels and signals received by four earth stations distributed evenly. Sketch the scenario and explain the operation.		6	2	4	3
ii.	With an aid of neat diagram, explain direct sequence spread spectrum.		6	2	4	3
32. a.	Analyze the influence of orbital spacing, Power, Frequency, Polarization Transponder capacity and Bit rate parameters on Direct Broadcast Satellite's (DBS) performance.		12	3	5	7
	(OR)					
b. i.	Show the usefulness of GPS and explain the operation of GPS.		6	3	5	3
ii.	Predict the growth Mobile Satellite services. Discuss about Multiple satellite services.		6	3	5	3

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Reg. No.														

B.Tech. DEGREE EXAMINATION, MAY 2023

Sixth to Eighth Semester

18ECE223T – SATELLITE COMMUNICATION AND BROADCASTING

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

		Marks	BL	CO	PO
	PART – A (20 × 1 = 20 Marks) Answer **ALL** Questions				
1.	The line joining the ascending and descending nodes through the center of the earth is called (A) Line of aries (B) Point of node (C) Line of nodes (D) Line of earth	1	1	1	1
2.	The perigee and apogee of an elliptical satellite orbits are 600 km and 3000 km the value of semi major axis is (A) 180 km (B) 2000 km (C) 1800 km (D) 3600 km	1	2	1	1
3.	The inclination of polar orbit is around (A) 90° (B) 360° (C) 45° (D) 30°	1	2	1	7
4.	An average value of the angular position of the satellite with reference to the perigee is called (A) True anomaly (B) Average abnormality (C) Mean anomaly (D) Average apogee	1	1	1	1
5.	BCH, Reed Solomon and hamming codes are classified as (A) Error codes (B) Compression codes (C) Block codes (D) Convolution code	1	1	2	3
6.	Find the effective area of isotropic antenna $[A_0]$, if frequency is 10 GHz (A) 15 dB (B) 2.1 dB (C) –10 dB (D) –41.45 dB	1	2	2	4
7.	Unit of carrier-to-noise spectral density ratio is (A) Db (B) DHz (C) dW (D) dBHz	1	1	2	4
8.	Forward error correction codes are employed in satellite communication to (A) Increase complexity (B) Avoid redundancy (C) Increase power consumption (D) Avoid retransmission	1	2	2	4

9.	Reaction wheels are used in _____ stabilized systems. (A) One-axis (B) Three-axis (C) Seven-axis (D) Cube	1	1	3	1
10.	Radiation mirrors and thermal blankets are used in satellite (A) To increase payload (B) To offer stability (C) To generate power (D) To maintain temperature	1	1	3	3
11.	Spot beams and polarization reuse methods are employed to (A) Increase bandwidth (B) Decrease power (C) Increase power (D) Maintain attitude	1	2	3	3
12.	Cable TV operators employ _____ to receive signals from satellites. (A) Direct to home systems (B) Community antenna systems (C) Whip antenna system (D) Isometric antenna system	1	1	3	1
13.	A carrier occupies the whole of the available bandwidth of a transponder. This types of access is called (A) Multiple access (B) Full access (C) Single access (D) Uni access	1	1	4	3
14.	The reason behind the frame period is chosen to be multiple of 125 μs is (A) To match sampling rate of pulse code modulation (B) To built the encoder (C) To make good receiver (D) To match quantization level of pulse amplitude modulation	1	2	4	4
15.	The number of earth stations that can be accommodated in common signaling channel of SPADE system excluding reference station is (A) 50 (B) 49 (C) 12 (D) 128	1	1	4	4
16.	Multiple access scheme that relies on spread spectrum technique is called (A) Time division multiple access (B) Frequency division multiple access (C) Space division multiple access (D) Code division multiple access	1	1	4	3
17.	MPEG 1 audio layer 3 is popularly known as (A) MP4 (B) AAL (C) MP3 (D) Bluetooth	1	1	5	3
18.	The number of bits generated by 30 seconds streo quality compact disc recording is (A) 1.4 Mbits (B) 18000 bits (C) 42 Mbits (D) 520 Kbits	1	2	5	3
19.	Topology used in VSAT network is (A) Alohz (B) Stop and wait (C) Ring (D) Star	1	2	5	3

20.	Frequency bands used by satellite mobile services are (A) L and S band (B) Ku band (C) K_2 and C band (D) X and Y band	1	1	5	7

PART – B (5 × 4 = 20 Marks)
Answer **ANY FIVE** Questions

		Marks	BL	CO	PO
21.	Express the first and second Kepler laws that governs satellite motion.	4	1	1	7
22.	A satellite is operated at EIRP of 60dBW with an output backoff of 5dB. The transmitter feeder lower amount to 1dB, and the antenna gain in 50dB. Calculate the power output of the TWTA required for full saturated EIRP.	4	4	2	4
23.	Cheerapunji town has rainy season for 9 months and receives rainfall of 11000mm. State the effect of rain on Ku band each station installed in Cheerapunji and give means to mitigate it.	4	4	2	3
24.	Sketch the wideband receiver and mark the components. Give two important features of wideband receiver.	4	2	3	1
25.	Illustrate the importance of travelling Wave Tube Amplifier (TWTA) in Satellite Communication.	4	3	4	4
26.	Bring out the use of Preample and Postample used in Time Division Multiple Access.	4	3	4	4
27.	Find the bit rate of satellite digital Television with following specifications. It has a bandwidth of 24MHz, a roll of factor of 0.5 and uses QPSK modulation.	4	3	5	3

PART – C (5 × 12 = 60 Marks)
Answer **ALL** Questions

			Marks	BL	CO	PO
28. a.	i.	Analyze in detail, different satellite launch vehicles.	8	3	1	1
	ii.	A satellite is orbiting in the equatorial plane with a period from perigee to perigee of 6 hours. Assume earth as perfect spherical and $\mu=3.986 \times 10^{14} m^3/S^2$	4	3	1	1
		(OR)				
	b.	Apply the principles of spherical geometry to find antenna look angles for Geosynchronous Orbit (GSO) satellite. Explain each step in detail	12	3	1	7
29. a.		Derive the expression for saturation flux density.	12	3	2	3
		(OR)				
	b.	i. Construct an equation to calculate power budget for satellite link. Discuss various types of transmission losses.	8	3	2	3