Reg. No.														

B.Tech. DEGREE EXAMINATION, NOVEMBER 2022
Sixth and Seventh Semester

18ECE223T – SATELLITE COMMUNICATION AND BROADCASTING
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

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** should be answered in answer booklet.

Time: 2½ Hours | Max. Marks: 75

PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
1. If the orbit is in circular form, then its eccentricity is (A) $e>0$ (B) $e<0$ (C) $e=0$ (D) $e=1$	1	1	1	1
2. From Kepler's law, it states that for equal time intervals, satellite sweep out _____ (A) Unequal (B) Equal (C) Less (D) More	1	1	1	1
3. The point where the orbit crosses the equatorial plane going from north to south is known as _____ (A) Ascending node (B) Descending node (C) Line to apsides (D) Line of nodes	1	2	1	1
4. The sun appears as an extremely noisy source which completely blanks out the signal from the satellite and this effect is termed as _____ (A) Geostationary (B) Sub satellite (C) Satellite (D) Sun transit outage	1	1	1	1
5. Universal time in the normal form of hrs, mins and seconds, it is converted to fractional days as (A) $UT_{days}=\frac{1}{24}\left(hours\times\frac{minutes}{60}+\frac{seconds}{3600}\right)$ (B) $UT_{days}=\frac{1}{24}\left(hours+\frac{minutes}{60}\times\frac{seconds}{3600}\right)$ (C) $UT_{days}=\frac{1}{24}\left(hours\times\frac{minutes}{60}\times\frac{seconds}{3600}\right)$ (D) $UT_{days}=\frac{1}{24}\left(hours+\frac{minutes}{60}+\frac{seconds}{3600}\right)$	1	2	1	1
6. The satellite orbit close to the earth is _____ (A) Apogee (B) Perigee (C) Prograde (D) Zenith	1	1	2	3

PART – B (5 × 10 = 50 Marks)
Answer **ALL** Questions

	Marks	BL	CO	PO
26. a.i. Determine the orbit eccentricity of a satellite moving in an elliptical orbit having semi-major axis equal to 16000 km, if the difference between apogee and perigee is 25000 km, and the earth radius is 6360 km.	4	3	1	1
ii. Explain the information required to determine the antenna look angles for GEO satellite with neat diagram.	6	3	1	1
(OR)				
b.i. The orbital period of a satellite is 650 minutes. Determine the semi-major axis of the elliptical orbit.	4	3	1	1
ii. Explain the effect of non-spherical earth.	6	3	1	1
27. a. Drive the link power budget equation for the EIRP-losses and explain each term in it.	10	4	2	4
(OR)				
b. Explain the effects of rain on satellite communication with N-S and E-W manures.	10	3	2	3
28. a. How the altitude of satellite is controlled? Explain in detail with classification.	10	3	3	3
(OR)				
b. How do the TT & C subsystem perform abroad the space craft?	10	3	3	1
29. a. Derive the downlink analysis of FDMA for K carries which share the output power equally, and each requires a bandwidth B, with respect to carrier to noise ratio.	10	4	4	4
(OR)				
b. Drive the expression for the maximum number of channels that can be estimated in a CDMA system and what are its advantages.	10	4	4	4
30. a. With neat diagram, describe the video compression process used in MPEG-2.	10	3	5	3
(OR)				
b. With neat block diagram explain the operation of home receiver indoor unit.	10	3	5	7

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7. The overall noise temperature T_e, absolute temperature T and noise figure F are related as — 1 2 2 3
(A) $T_e = T(F-1)$ (B) $T_e = F(T-1)$
(C) $T = T_e(F-1)$ (D) $T_e = (T)(F)$

8. The relationship between $[BO]_i$ and $[BO]_0$ is _____ — 1 2 2 3
(A) $[BO]_o = [BO]_i - 10dB$ (B) $[BO]_o = [BO]_i - 6dB$
(C) $[BO]_o = [BO]_i - 5dB$ (D) $[BO]_o = [BO]_i - 15dB$

9. The effective noise temperature of the rain is given by — 1 1 2 3
(A) $T_{rain} = T_a[1-A]$ (B) $T_{rain} = T_a[1+A]$
(C) $T_{rain} = T_a\left[1-\frac{1}{A}\right]$ (D) $T_{rain} = T_a\left[1+\frac{1}{A}\right]$

10. A satellite link is operating at 14 GHz has receiver feeder loss of 1.5 dB and free space loss 207 dB. The atmospheric absorption loss in 0.5 dB, antenna pointing loss is 0.5 dB depolarization loss is neglected. What is the total line loss for clear sky condition? — 1 2 2 4
(A) 209.5 dB (B) 210.5 dB
(C) 219.5 dB (D) 220.5 dB

11. In a spin stabilized GEO satellite, the spin axis is — 1 1 3 1
(A) Perpendicular to the orbital plane (B) In the plane of the orbit
(C) Inclined at 45° at the orbital plane (D) Inclined at 6° to the orbit plane

12. The available bandwidth of a C-band transponder is — 1 1 3 3
(A) 600 MHz (B) 500 MHz
(C) 550 MHz (D) 1000 MHz

13. The satellite in which the antenna is mounted on a despun platform is _____ — 1 2 3 1
(A) Geostationary satellite (B) Sun synchronous satellite
(C) Spin stabilized satellite (D) 3-axis body stabilized satellite

14. The satellite altitude may be altered along normal to the orbital plane is called as _____ — 1 2 3 1
(A) Yaw axis (B) Pitch axis
(C) Roll axis (D) Spin axis

15. The isotropic power gain for a paraboloidal antenna in antenna subsystem is _____ — 1 1 3 1
(A) $G = \eta\left(\frac{\pi D^2}{\lambda}\right)$ (B) $G = \eta\left(\frac{\pi\lambda^2}{D}\right)$
(C) $G = \eta\left(\frac{\pi D}{\lambda}\right)^2$ (D) $G = \eta\left(\frac{\pi D}{\lambda^2}\right)$

16. _____ is the multiple access technique, where the full bandwidth is used by all users for all time. — 1 1 4 3
(A) FDMA (B) TDMA
(C) CDMA (D) LDMA

17. A form of CDMA, where a digital code is used to continually change the frequency of the carrier is _____ — 1 1 4 4
(A) Frequency hopping (B) Spread spectrum
(C) Store and forward (D) SPADE

18. In FDMA technique, the voice band channels are assigned on "as needed" basis — 1 2 4 4
(A) PAMA (B) SSMA
(C) CDMA (D) DAMA

19. The multiple earth stations share a satellite on the same frequencies using _____ technique. — 1 1 4 4
(A) Frequency reuse (B) Multiplexing
(C) Mixing (D) Frequency hopping

20. The satellite sends different information signals using vertical/horizontal electromagnetic polarization is _____ — 1 2 4 3
(A) Multiple coverage across (B) Dual polarization
(C) Spatial separation (D) Spread spectrum

21. For DBS TV transmission the downlink frequency is about — 1 1 5 7
(A) 14 GHz (B) 10 GHz
(C) 6 GHz (D) 12 GHz

22. The type of modulation is used in DBS is _____ — 1 1 5 7
(A) FM (B) AM
(C) PCM (D) DPCM

23. Moving Picture Express Group (MPEG-2) is designed for high-quality DVD with a data rate of — 1 2 5 2
(A) 3 to 6 Mbps (B) 4 to 6 Mbps
(C) 5 to 6 Mbps (D) Only 6 Mbps

24. The minimum and maximum orbital spacing for satellite is — 1 1 5 7
(A) 2° and 10° (B) 10° and 18°
(C) 2° and 9° (D) 12° and 19°

25. Generally the VAST network is operated in — 1 2 5 7
(A) FDMA (B) TDMA
(C) CDMA (D) SDMA