Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Seventh Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECE0002: Satellite Communication

COURSE OUTCOMES

CO1: Discuss orbital mechanics and launch methodologies.
CO2: Describe various space subsystems.
CO3: Explain different subsystems of earth segment.
CO4: Apply signal processing for satellite communication.
CO5: Design and analyze link power budget for satellites.
CO6: Describe various Satellite Applications.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1.	Name any four orbital parameters defined in satellite communication.	CO1	[K_1]
2.	Determine the apogee and perigee distances for an elliptical satellite orbit with a semi-major axis of 8000 km and a semi-minor axis of 5000 km.	CO1	[K_3]
3.	List the key components of a spacecraft's power supply system.	CO2	[K_1]
4.	Distinguish between MATV and CATV.	CO3	[K_2]
5.	Define the terms Preamble and Postamble in FDMA.	CO4	[K_1]
6.	Justify the role of compression in digital video broadcast over satellite communication systems.	CO4	[K_2]
7.	A satellite downlink at 10 GHz operates with a transmit power of 5 W and an antenna gain of 40 dB. Solve the EIRP in dBW.	CO5	[K_3]
8.	Recall the attenuation effects of rain on the performance of satellite communication links.	CO5	[K_2]
9.	Define VSAT and state its primary use in satellite communication.	CO6	[K_1]
10.	Recall the functions of Orbcomm satellite system.	CO6	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Define Kepler's three laws of planetary motion with relevant equations and explain their significance for artificial satellites orbiting Earth.	8	CO1	[K_2]
	b)	Formulate a detailed procedure for launching a satellite into a specific orbit, considering the role of launch vehicles and orbital insertion.	8	CO1	[K_3]
12.	a)	Discuss the process of look angle determination for a satellite ground station.	8	CO1	[K_2]
	b)	Summarize the functional units of an earth station with a neat block diagram. Discuss how each unit contributes to the overall functionality and performance of the earth station.	8	CO3	[K_2]
13.	a)	Demonstrate the importance of Telemetry, Tracking, and Command (TT&C) systems in satellite missions with necessary diagrams.	10	CO2	[K_2]
	b)	Justify the importance of the thermal control sub-system in a Satellite.	6	CO2	[K_2]
14.	a)	Explain the principle behind spectrum spreading in CDMA by generating a pseudo-random code using a 4-bit shift register. Also, discuss various spread spectrum techniques.	10	CO4	[K_3]
	b)	The IF bandwidth for a CDMA system is 3 MHz, the roll-off factor for the filter being 1. The information bit rate is 2.4 kb/s, and an [$Eb/N0$] of 11 dB is required for each channel accessing the CDMA system. Determine the maximum number of channels permitted.	6	CO4	[K_3]
15.	a)	Explain the link power budget equation in satellite communication systems and discuss its importance in ensuring reliable communication.	10	CO5	[K_2]
	b)	Explain how the combined Carrier-to-Noise ratio (C/N) in satellite communication systems is evaluated considering both uplink and downlink contributions.	6	CO5	[K_3]
16.	a)	Summarize the main components of a GPS. Explain how the GPS determines the position of a user on Earth using trilateration.	10	CO6	[K_2]
	b)	Explain the role of Business TV (BTV) and GRAMSAT in enhancing communication for corporate and rural audiences.	6	CO6	[K_2]

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