Reg. No. : | E | N | G | G | T | R | E | E | . | C | O | M |

Question Paper Code : 50566

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fifth/Sixth Semester

Electronics and Communication Engineering

CEC 352 – SATELLITE COMMUNICATION

(Common to: Computer and Communication Engineering/ Electronics and Telecommunication Engineering)

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1.   Differentiate geostationary and geosynchronous orbit.

2.   Recall Kepler's three laws.

3.   How does the bandwidth of a transponder can be increased?

4.   List the functions of TTC & M in satellite communication.

5.   Mention the parameters involved in determining quality and strength of received signal.

6.   Calculate the free space loss at a frequency of 6 GHz, when the range between a ground station and a satellite is 40,000 km.

7.   Mention the advantages of CDMA in satellite communication.

8.   What is the use of control bits in the data frame?

9.   Differentiate GPS and differential GPS.

10. Classify the various types of satellite services.

PART B — (5 × 13 = 65 marks)

11. (a) Describe the theory and analysis in determining the look angles of the satellite.

Or

(b) Explain orbital perturbations and the methodologies to mitigate the same.

12. (a) Categorize the three main systems for tracking satellites. How can tracking systems be affected? Explain the main functions of TTC sub systems.

Or

(b) Analyze how attitude and orbit control systems helps in controlling the satellite system with neat sketches.

13. (a) Discuss the various types of system noise power present in satellite communication and suggest methodologies to mitigate the same.

Or

(b) A Satellite at 42000 km transmits 2 W of power with an antenna gain of 18 dB. Calculate flux density on earth surface, power received by antenna with effective aperture of 10 m², gain of receiving antenna and received C/N assuming T_s = 172 K and BW = 500 MHz operating at a frequency of 12 GHz.

14. (a) Perform a detailed analysis on how the compression and encryption of signals are carried out in communication satellites.

Or

(b) Perform a detailed analysis of the various channel allocation schemes applicable to satellite communication.

15. (a) Narrate the various applications of the Indian National Satellite System. Also, highlight how it enhanced the Indian education ecosystem.

Or

(b) Discuss the applications developed in satellite communication that had improved the transmission of video and audio signals benefiting the society with necessary sketches.

PART C — (1 × 15 = 15 marks)

16. (a) Evaluate the bit rate that can be accommodated by a satellite transponder operating with a bandwidth of 36 MHz transmitting a QPSK signal supported by a raised cosine filtering with roll off factor 0.2 which requires a BER of 10^{-5}. The link budget reveals the total loss of 200 dB in the downlink with the receiving earth station G/T of 32 dB/K.

Or

(b) Analyze how the specialized service like video conferencing, e-mail and internet have revolutionized the present day communication scenario.

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