**20EC702/PE**

**Hall Ticket Number:**

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| **IV/IV B.Tech (Regular) DEGREE EXAMINATION** | | | | |
| **January, 2024** | | **Electronics & Communication Engineering** | | |
| **Seventh Semester** | **Satellite Communication** | | | |
| **Time:** Three Hours | | | **Maximum:** 70 Marks | |
| ***Answer question 1 compulsory.*** | | | | **(14X1 = 14Marks)** |
| ***Answer one question from each unit.*** | | | | **(4X14=56 Marks)** |
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|  |  |  | CO | BL | M |
| 1 | a) | How do geostationary satellites differ from non-geostationary satellites in communication? | CO1 | L4 | 1M |
|  | b) | Illustrate the orbital parameters used for positioning a satellite. | CO1 | L3 | 1M |
|  | c) | What are polar orbiting satellites? | CO1 | L4 | 1M |
|  | d) | List the earth station parameters affecting the C/N ratio. | CO2 | L4 | 1M |
|  | e) | A satellite downlink at 12 GHz operates with a transmit power of 4W and an antenna gain of 40 dB. Calculate the EIRP in dBW | CO2 | L2 | 1M |
|  | f) | Write the equation of link budget. | CO2 | L4 | 1M |
|  | g) | Examine why noise temperature is a useful concept in communication receiver | CO2 | L1 | 1M |
|  | h) | What is the need of reference burst in TDMA? | CO3 | L4 | 1M |
|  | i) | What are the limitations of FDMA-satellite access? | CO3 | L4 | 1M |
|  | j) | Define the term preamble. | CO3 | L4 | 1M |
|  | k) | An intelligent VSAT must use what type of networking to permit the maximum utilization of the satellite capacity? | CO3 | L4 | 1M |
|  | l) | Write any two features of GPS | CO4 | L4 | 1M |
|  | m) | What are the three segments of the GPS system, and what roles do they play? | CO4 | L4 | 1M |
|  | n) | What is satellite navigation? | CO4 | L4 | 1M |
| **Unit-I** | | | | | |
| 2 | a) | What are look angles? Explain how they are determined for geo stationary orbits? | CO1 | L3 | 8M |
|  | b) | A satellite in an elliptical orbit around the earth with a perigee of 1500 Km and apogee of 6000 Km. Find the period and eccentricity of the orbit. | CO1 | L2 | 6M |
| **(OR)** | | | | | |
| 3 | a) | State and Explain Kepler’s three laws of motion with suitable diagrams? | CO1 | L3 | 7M |
|  | b) | Outline the steps in launching a communication satellite. | CO1 | L1 | 7M |
| **Unit-II** | | | | | |
| 4 | a) | What are the three main systems for tracking satellites? How can tracking systems be affected? What are the main functions of TTC subsystem? | CO2 | L4 | 7M |
|  | b) | Derive the G/T ratio of the satellite communication with the help of system noise temperature. | CO2 | L2 | 7M |
| **(OR)** | | | | | |
| 5 | a) | Justify the reasons behind why the transponders are connected in the communication channel with a neat diagram? | CO2 | L1 | 8M |
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|  | b) | An earth station antenna has a diameter of 20 m, has an overall efficiency of 72 % and is used to receive a signal at 4.5 GHz. At this frequency the system noise temperature is 82K when the antenna points at the satellite at an elevation angle of 280. What is the earth station G/T ratio under these conditions? If heavy rain causes the sky temperature increases so that the system noise temperature rises to 88 K, What is new G/T value? | CO2 | L2 | 6M |
| **Unit-III** | | | | | |
| 6 | a) | Explain in detail how carrier recovery is done in TDMA. What is the advantage of TDMA over FDMA with respect to demand assignment? | CO3 | L3 | 7M |
|  | b) | Provide a concise explanation of the access control protocols employed in Very Small Aperture Terminal (VSAT) systems. | CO3 | L3 | 7M |
| **(OR)** | | | | | |
| 7 | a) | Elaborate on the principles of Frequency Division Multiple Access (FDMA) and list the types of interference associated with FDMA | CO3 | L3 | 7M |
|  | b) | With a neat diagram explore the network configuration in a Very Small Aperture Terminal (VSAT) system? | CO3 | L3 | 7M |
| **Unit-IV** | | | | | |
| 8 | a) | Examine the fundamental principles of Global Positioning System (GPS) technology in determining precise position locations? | CO4 | L1 | 7M |
|  | b) | What are the key components of a GPS receiver and describe the working of GPS receiver operation | CO4 | L4 | 7M |
| **(OR)** | | | | | |
| 9 | a) | Delve into the principles, applications, and significance of Differential Global Positioning System (DGPS). Discuss how DGPS improves the accuracy of standard GPS? | CO4 | L1 | 7M |
|  | b) | What is GPS navigation message and explain the functioning of different segments in GPS. | CO4 | L1 | 7M |

