Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EC2050** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BASICS OF SATELLITE COMMUNICATION** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q.**  **No.** | **Sub**  **Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Define Apogee and Perigee. | CO2 | 4 |
| b. | A satellite orbit has an eccentricity of 0.2 and a semi-major axis of 10,000km. Find the values of the latus rectum, the minor axis and the distance between the foci. | CO2 | 6 |
| c. | State Kepler’s First law and illustrate its relevance to artificial satellites orbiting the earth. | CO2 | 10 |
| **(OR)** | | | | |
| 2. | a. | List the various Keplerian elements used in satellite communication. | CO2 | 4 |
| b. | What are lock angles? Explain them with reference to a geostationary satellite and the earth station. | CO2 | 6 |
| c. | Explain what is meant by geostationary orbit. Compare and list the differences between a geostationary orbit and geosynchronous orbit. | CO2 | 10 |
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| 3. | a. | What is an inter modulation noise? | CO1 | 4 |
| b. | Explain what is meant by satellite attitude and briefly describe the two forms of attitude control. | CO1 | 16 |
| **(OR)** | | | | |
| 4. | a. | Briefly discuss about momentum wheel stabilization in satellites. | CO1 | 4 |
| b. | Describe briefly the antenna subsystem and ANIK-E. | CO1 | 16 |
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| 5. | a. | A satellite downlink at 12 GHz operates with a transmit power of 6W and antenna gain of 48.2dB. Find EIRP in dBW. | CO3 | 4 |
| b. | A satellite circuit has the following parameters:  Uplink:- Saturation flux density:-68dBw/m2; Input back-off:11dB; Satellite G/T:-12dBK  Downlink:- satellite saturation EIRP:26.5dBW; Output back-off:6dB; Transmission pathloss:203dB; Earth station G/T: 41dB/K.  Calculate the carrier-to-noise density ratio for uplink and downlink and the combined value. | CO3 | 6 |
|  | c. | Derive the general link equation. Find out an expression for C/N and G/T ratios. Explain the importance of these ratios on satellite link design. | CO3 | 10 |
| **(OR)** | | | | |
| 6. | a. | Define Frame efficiency with respect to TDMA. | CO3 | 4 |
| b. | An antenna has noise temperature of 35K and is matched into a receiver which has a noise temperature of 100K. Calculate the noise power for a bandwidth of 36 MHz. | CO1 | 6 |
| c. | With neat diagrams, explain CDMA system design for satellite communication. | CO3 | 10 |
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| 7. | a. | Briefly explain the atmospheric and rain effects on link performance. | CO2 | 10 |
| b. | With examples, explain the operation of weather and maritime satellites launched by India. | CO3 | 10 |
| **(OR)** | | | | |
| 8. | a. | Discuss the design issues to be considered for launching DTH system. | CO3 | 10 |
| b. | Explain the various tracking techniques available in earth stations. | CO3 | 10 |
|  |  | **Compulsory:** |  |  |
| 9. | a. | Illustrate with diagram(s), the terms roll, pitch and yaw. | CO2 | 5 |
| b. | Calculate the gain of a 3m paraboidal antenna operating at a frequency of 12GHz. Assume an aperture efficiency of 0.55. | CO1 | 5 |
| c. | Draw the signal structure of a GPS and explain the need for multiplexing of GPS signals. | CO3 | 10 |