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| Enroll No |
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K.E.Society's
Rajarambapu Institute of Technology, Rajaramnagar
 (An Empowered Autonomous Institute, affiliated to SUK)
Mid-Sem Exam (MSE) (2025-26)
 Final Year B.Tech. ETC

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| Q.P. Code |
| M156 |

Course Code:EC4154

Course Name: Satellite Communication

Day & Date: *Friday 19/09/2025*

Time: *3:15 To 5:15*

Max Marks- 50

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures in rounded () brackets within the question, indicate the scheme of marking for respective part of the question, whereas, figures in the first right column indicate total marks for that whole question.
 - 3) CO is the index number of the Course Outcome statement.
 - 4) The Bloom's taxonomy level (BL) for 1,2,3,4,5 and 6 is remember, understand, apply, analyze, evaluate and create respectively.
 - 5) Assume suitable data if necessary.
 - 6) Use of non-programmable calculators is allowed

| | | Marks | BT Level | COs |
|-----|--|-------|----------|-----|
| Q.1 | A Describe orbital elements with figures (6). Why are they important in satellite communication (2)? | 08 | 2 | 1 |
| | B A GEO satellite is located at an altitude of 35,786 km above the Earth's surface. If the Earth's radius is 6378.14 km, calculate the maximum coverage radius on the Earth's surface. | 08 | 3 | 1 |
| OR | | | | |
| | B A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. Using a mean earth radius of 6378.14 km find the period of the orbit in hours, minutes and seconds and the eccentricity of the orbit. | 08 | 3 | 1 |
| Q.2 | A Describe principle of N-S control of a spinner satellite | 08 | 2 | 2 |
| | B Justify the need of redundancy in satellite (3). How and where redundancy is provided in satellite (5)? | 08 | 4 | 2 |
| Q.3 | A Justify that in the design of satellite link, system noise temperature is proportional to noise temperature of RF amplifier | 09 | 4 | 3 |
| | B A geostationary satellite at a distance of 36000 km from the surface of the earth radiates a power of 10Watts in the desired direction through an antenna having a gain of 20 dB. What would be the power density at a receiving site on the surface of the earth and also the power received by an antenna having an effective aperture of 10m ² ? | 09 | 3 | 3 |



OR

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|---|--|----|---|---|
| B | A C-band earth station has an antenna with a transmit gain of 54 dB. The transmitter output power is set to 100 W at a frequency of 6.100 GHz. The signal is received by a satellite at a distance of 37,500 km by an antenna with a gain of 26 dB. The signal is then routed to a transponder with a noise temperature of 500 K, a bandwidth of 36 MHz, and a gain of 110 dB. Calculate the path loss at 6.1 GHz. Wavelength is 0.04918 m. Calculate the power at the output port of the satellite antenna, in dBW. Calculate the noise power at the transponder input, in dBW, in a bandwidth of 36 MHz. Calculate the C/N ratio, in dB, in the transponder. Calculate the carrier power, in dBW and in watts, at the transponder output. | 09 | 3 | 3 |
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