



**P.E.S. College of Engineering, Mandya - 571 401**  
 (An Autonomous Institution affiliated to VTU, Belagavi)  
**Eighth Semester, B.E. - Electronics and Communication Engineering**  
**Semester End Examination; July / Aug. - 2022**  
**Satellite Communication**

Time: 3 hrs

Max. Marks: 100

**Course Outcome**

**The Students will be able to:**

**CO1:** Recall the fundamentals of orbital mechanics, the characteristics of common orbits used by communications another satellite.

**CO2:** Understand the systems required by a communications satellite to function and the trade-offs and limitations encountered in the design of a communications satellite system.

**CO3:** Model the concepts of signal propagation affects, link design, rain fading and link availability and perform interference calculations.

**CO4:** Calculate an accurate link budget for a satellite or other wireless communication networks.

**CO5:** Understand the analog and digital technologies used for satellite communication networks.

**Note: I) PART - A** is compulsory. **Two** marks for each question.

**II) PART - B:** Answer any **Two** sub questions (from a, b, c) for a Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
<b>I : PART - A</b>		<b>10</b>			
I a.	Calculate the time in days, hours, minutes and seconds for the epoch day 324.95616765.	2	L2	CO1	PO1
b.	Write the equation of Faraday rotation angle $\phi$ in the atmosphere.	2	L1	CO2	PO2
c.	Determine the miss probability for the following values: N: = 40 E: = 5 P: = $10^{-3}$	2	L3	CO3	PO3
d.	Write the equation for the power output of the TWTA.	2	L3	CO4	PO4
e.	Write any two applications seen for Radar Sat.	2	L1	CO5	PO5
<b>II : PART - B</b>		<b>90</b>			
<b>UNIT - I</b>		<b>18</b>			
1 a.	Discuss the following: i) Universal Time    ii) Julian Dates    iii) Sidereal Time	9	L2	CO1	PO1
b.	A geostationary satellite is located at $90^\circ\text{W}$ . Calculate the azimuth angle for an earth station antenna at latitude $35^\circ\text{N}$ and longitude $100^\circ\text{W}$ . Also find the range and antenna elevation angle.	9	L3	CO1	PO1
c.	State and explain Kepler's law of planetary motion with neat diagram and equations.	9	L2	CO1	PO1
<b>UNIT - II</b>		<b>18</b>			
2 a.	With block diagram, explain satellite wide band receiver in detail.	9	L2	CO2	PO2
b.	Explain transmit-receive earth station with a more detailed block diagram.	9	L2	CO2	PO2
c.	Briefly explain the antenna subsystem.	9	L2	CO2	PO2

**UNIT - III****18**

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|------|---|---|----|-----|-----|
| 3 a. | Discuss FDMA downlink analysis in detail.                             | 9 | L3 | CO3 | PO2 |
| b.   | Explain the following:  |   |    |     |     |
|      | i) S/N ratio for FM video transmission                                | 9 | L2 | CO3 | PO1 |
|      | ii) SCPC FM links   |   |    |     |     |
|      | iii) FM threshold   |   |    |     |     |
| c.   | Explain reference burst, preamble and postamble with respect to TDMA. | 9 | L2 | CO3 | PO1 |

**UNIT - IV****18**

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|------|--|---|----|-----|-----|
| 4 a. | Describe transmission losses.  | 9 | L2 | CO4 | PO2 |
| b.   | Explain the following:   |   |    |     |     |
|      | i) Output back off   | 9 | L3 | CO4 | PO2 |
|      | ii) Satellite TWTA output  |   |    |     |     |
| c.   | Explain Enhancing TCP over satellite channels using standard mechanisms. | 9 | L2 | CO4 | PO1 |

**UNIT - V****18**

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|------|---|---|----|-----|-----|
| 5 a. | With a block diagram, explain MPEG-2 Encoder paths.       | 9 | L2 | CO5 | PO1 |
| b.   | Explain the following:                                    |   |    |     |     |
|      | i) Frequencies and polarization                           | 9 | L3 | CO5 | PO1 |
|      | ii) Transponder capacity                                  |   |    |     |     |
| c.   | Explain Radar sat objectives and applications in details. | 9 | L2 | CO5 | PO2 |

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