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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 09- 01- 2025 **Time:** 9:30 am – 12:30 pm |

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| **School:** SOE | **Program:** B. Tech ECE | |
| **Course Code :**ECE3055 | **Course Name :**SATELLITE COMMUNICATION | |
| **Semester**: VII | **Max Marks**:100 | **Weightage**:50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **15** | **15** | **30** | **40** | **0** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | The communication in the satellite happens in two parts .Draw the block diagram showing the basic working of a satellite. | **2 Marks** | **L1** | **CO1** |
| **2** | The rock fuel is used for maintaining the power supply unit.Breifly write a short note on the power supply unit of a satellite. | **2 Marks** | **L1** | **CO3** |
| **3** | System noise is one of the parameter in link budget calculation. Explain briefly the system noise with an equation. | **2 Marks** | **L2** | **CO2** |
| **4** | Absorptive networks plays a vital role in the network analysis. Define Absorptive networks. | **2 Marks** | **L1** | **CO2** |
| **5** | Attitude of a satellite refers to orientation of a satellite in space. Name the types of Attitude control techniques. | **2 Marks** | **L1** | **CO3** |
| **6** | TDMA and FDMA are the two efficient methods of multiple access used for data communication. Bring out 4 differences between TDMA and FDMA. | **2 Marks** | **L1** | **CO4** |
| **7** | FDMA is one of the efficient method used for multiple access .Define pre assigned FDMA technique briefly | **2 Marks** | **L1** | **CO4** |
| **8** | Orbital period of a satellite gives information about the time taken by the satellite to complete one rotation. Calculate the orbital period of a satellite moving in an elliptical orbit having a major axis of 70,000km.Take µ=39.8X1013Nm2/Kg. | **2 Marks** | **L2** | **CO1** |
| **9** | GLONASS is a application which uses a constellation of ---------number of satellites. | **2 Marks** | **L1** | **CO4** |
| **10** | The GSM has many air interface that provides link between link layer and the network layer. Explain the function of BCCH air interface in GSM | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks** | | | | | |
| **11.** | **a.** | The global navigation satellite system is effective and efficient in providing the real time positioning and timing services. Elucidate in detail the working principle of Global positioning system enclosing the details of different segments included in operation of GPS. | **10**  **Marks** | **L2** | **CO4** |
| **Or** | | | | | |
| **12.** | **a.** | Depending on the usage of transponder channels the satellite acess methods are classified .Name the classification of satellite acess methods .Explain in detail with the necessary block diagrams the SPADE communication system or the SPADE system. | **10**  **Marks** | **L2** | **CO4** |
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| **13.** | **a.** | Amplifiers in cascade determine the overall noise temperature . A 24 GHz receiver consists of an RF stage with gain G1 = 60 dB and noise temperature T1 = 80 K, a down converter with gain G2 = 50 dB and noise temperature T2 = 520 K and an IF amplifier stage with gain G3 = 35 dB and noise temperature T3 = 1080 K. Calculate the effective noise temperature and noise figure of the system. Take the reference temperature to be 290 K. Also find the overall noise figure by calculating the individual noise figures of the stages mentioned. | **10**  **Marks** | **L3** | **CO2** |
| **or** | | | | | |
| **14.** | **a.** | A satellite is moving in an elliptical orbit with the major axis equal to 42 000 km. If the perigee distance is 8000 km, find the apogee and the orbit eccentricity.Also Determine the relationship between their orbital periods if the semi-major axes of the two satellites are given as 27000 km (satellite 1) and 54 000 km (satellite 2). | **10**  **Marks** | **L3** | **CO2** |

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| **15.** | **a.** | Station keeping is a method followed to keep the satellites in its orbit.Explain in detail what is maneuvers with the types of Station Keeping maneuvers and and the steps followed to overcome the maneuvers. | **10**  **Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **16.** | **a.** | The tracking, telemetry and command (TT&C) subsystem monitors and controls the satellite right from the lift-off stage to the end of its operational life in space.With a neat block diagram give a detailed explanation about TT&C operation. | **10**  **Marks** | **L2** | **CO3** |

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| **17.** | **a.** | Orbital Perturbations are defined as the disturbances caused in the movement of the satellites in its orbit.Bring out the detailed explained about orbital perturbation and its types.Also Write a short note on propulsion and launch vehicles of the satellites. | **15**  **Marks** | **L2** | **CO2** |
| **Or** | | | | | |
| **18.** | **a.** | The carrier to noise ratio defines the efficiency parameters of uplink and downlink of the satellite.Derive the CNR with the essential explanation for both uplink and downlink with the help of FRISS TRANSMISSION FORMULA.also explain the basic link analysis with the neat block diagram . | **15**  **Marks** | **L2** | **CO2** |

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| **19.** | **a.** | Transmission Losses are defined as the losses that occur in the received signal during transmission of the signal between earth station and space station .Explain in detail all the types of transmission loses .Also Define and explain the RPY axes of satellite. | **15**  **Marks** | **L2** | **CO2,CO3** |
| **Or** | | | | | |
| **20.** | **a.** | Johannes Kepler derived empirically three laws describing planetary motion. Kepler’s laws apply quite generally to any two bodies in space which interact through gravitation .State and explain the three kepler’s laws related to satellites.Also write a short note on Wide band receivers. | **15**  **Marks** | **L2** | **CO2,CO3** |

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| **21.** | **a.** | Global system for Mobile (GSM) is a second generation cellular standard developed to cater the voice and data services using digital modulation .Explain in detail the architecture of GSM with necessary block diagram.Explain the process of CDMA(code division multiple access)with transmitter and receiver block diagrams. | **20**  **Marks** | **L2** | **CO4** |
| **Or** | | | | | |
| **22.** | **a.** | TDMA uses reference station for Burst synchronization.Explain in detail the frame structure with the necessary diagrams.Explain the basic equipment block of TDMA with relevant diagram.Explain the carrier recovery circuit of TDMA with the relevant diagram. | **20**  **Marks** | **L2** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***