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**Presidency University**

**Bengaluru**

**SCHOOL OF ENGINEERING**

**SUMMER TERM ENDTERM EXAMINATION –AUGUST 2024**

**Summer Term**: 2023 - 24

**Course Code**: ECE 3055

**Course Name**: Satellite Communication

**Program & Sem**: B Tech & VII/VIII Sem

**Date**: 6th August 2024

**Time**: 1:00PM to 4:00PM

**Max Marks**: 100

**Weightage**:50%

**Instructions:**

1. *Read the all questions carefully and answer accordingly.*
2. *Answer all the questions*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 2 marks. (2Qx5M= 10M)**

1.The maneuvers in which the Counteracting jets must be pulsed when the inclination is at zero to halt the change in incli[nation are termed as-------------------------------- (C.O.No.3) [Knowledge]

2.  \_\_\_\_\_\_\_\_\_\_\_ is present on the satellites of GPS to contribute the accurate time information.

(C.O.No.4) [Knowledge]

3.We have many points defined on the axis of the satellite such as Apogee,Perigee,barycenter,epicenter etc . The point of farthest sest approach to earth is termed as --------- (C.O.No.2) [Knowledge]

4. For an artificial satellite, rotating around the Earth in an elliptical orbit, the lengths of semi major axis and semi minor axis are 14000 km & 7000 km respectively. Determine the eccentricity (e), of the elliptical orbit.

(C.O.No.2) [Knowledge]

5. The Global Navigation system is GPS .The GPS comprises of three segments.Name them

(C.O.No.4) [Knowledge]

6. The [EIRP] can be considered as the input power to a transmission link. Now that the losses for the link have been identified.Write The Link-Power Budget Equation considering all the loses.

(C.O.No.2) [Knowledge]

7. The percentage of surface coverage of earth’s surface by the satellite is the most important factor in deciding the efficiency of satellites.Geosynchronous satellites cover ………..part of the surface of the earth.

(C.O.No.1) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 10 marks. (5Qx10M=50M)**

1. 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.

(C.O.No.1) [Comprehension]

2. Transmission losses of the satellite play a very important role in deciding the factors of efficiency in the link of transmission and reception of the signals.Name and Explain in details all the types of transmission losses of the satellite.

(C.O.No.2) [Comprehension]

3. Orbital parameters are the factors used for measuring the performance of the satellite in terms of angle,precision ,angle,etc.Define the following orbital parameters a)Eccentricity b)Semi major Axis. c)Barycenter d)Atmospheric drag e)Satellite Graveyard (C.O.No.2) [Comprehension]

4. 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.

(C.O.No.3) [Comprehension]

5. In the discussion held with my friends about multiple access techniques used in satellite communication ,The Technique in which the signal information is transmitted in Bursts which is suitable for transmission of digital signals is TDMA .The carrier recovery circuits are used in the frequency conversion of signals .With Basic equipment Blocks bring out the detailed note on the TDMA system and its bursts formats along with its carrier recovery circuit. (C.O.No.4) [Comprehension]

6. The Global Navigation system is GPS .The GPS comprises of three segments namely the space segment,control segment and user segment.Explain in detail all these 3 segments along with the working principle of GPS. (C.O.No.4) [Comprehension]

7. GSM is termed as Global System for Mobile Communications.Explain in detail several subsystems involved in the GSM architecture .Write its Applications. (C.O.No.3) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer all the Questions. Each question carries 10 marks. (4Qx10M=40M)**

1. Amplifiers in cascade determine the overall noise temperature . A 12 GHz receiver consists of an RF stage with gain G1 = 30 dB and noise temperature T1 = 20 K, a down converter with gain G2 = 10 dB and noise temperature T2 = 360 K and an IF amplifier stage with gain G3 = 15 dB and noise temperature T3 = 1000 K. Calculate the effective noise temperature and noise figure of the system. Take the reference temperature to be 290 K. (C.O.No.2) [Analysis]

2.The parameters that determine the orbital speed are the orbital parameters.The apogee and perigee distances of a satellite orbiting in an elliptical orbit are respectively 45 000 km and 7000 km. Determine the following: 1). Semi-major axis of the elliptical orbit 2). Orbit eccentricity 3)Distance between the centre of the Earth and the centre of the elliptical orbit. (C.O.No.1) [Analysis]

3. A satellite is moving in an elliptical orbit with the major axis =42000 KM.If the perigee distance is 8000KM.Find the Apogee and the orbit eccentricity. (C.O.No.1) [Analysis]

4. Briefly describe the overall working of a Direct Broadcast Satellite (DBS) television network. Explain the working of a DBS-TV receiver with the help of a neat block diagram. (C.O.No.4) [Comprehension]

5.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. (C.O.No.2) [Analysis]