Seat No.

Total No. of Pages : 3

OCT-NOV 2025 WINTER EXAMINATION

1154 B.Tech. CBCS

Sub. Name: Satellite Communication

Sub. Code: 83823/84049

Day and Date: Saturday ,13-12-2025 **Total Marks: 70**

Time: 02:30 PM To 05:00 PM

Instructions:
1. **All questions are compulsory**
2. **Assume suitable data wherever necessary and mention it boldly**
3. **Draw neat labelled diagrams wherever necessary**
4. **Figures to the right indicate full marks**
5. **Use of Scientific calculator is allowed**

Q1) Solve following MCQ. **[14]**

i. Which of the following is the primary advantage of satellite communication?
- A. Low power consumption
- B. Wide area coverage
- C. Low equipment cost
- D. No propagation delay

ii. Which subsystem maintains the satellite in its correct orientation?
- A. AOCS (Attitude and Orbit Control System)
- B. Telemetry subsystem
- C. Power subsystem
- D. Communication subsystem

iii. G/T ratio refers to:
- A. Group-to-total ratio
- B. Geometric-to-tangent ratio
- C. Gain-to-temperature ratio
- D. Gravity-to-thrust ratio

iv. In satellite networks, onboard processing with transparent switching means:
- A. Regeneration of signals
- B. Digital regeneration
- C. Amplification with decoding
- D. Frequency translation without demodulation

v. LEO satellites typically operate at altitudes of:
- A. 36,000 km
- B. 500–2000 km
- C. 10,000 km
- D. 100,000 km

vi. Weather satellites primarily use _____ sensors.

A. Optical and infrared
B. UV only
C. Sound sensors
D. Magnetic probes

vii. Satellite radio broadcasting uses:

A. AM bands
B. FM only
C. Digital audio signals via satellites
D. Analog shortwave

Q2) Answer any two questions **[14]**

a. Discuss different methods of satellite launching. **[7]**

b. With block schematic, explain single conversion (bend pipe) and double conversion transponder. **[7]**

c. Explain Attitude and orbit control system (AOCS) of satellite. **[7]**

Q3) Answer any two questions **[14]**

a. Explain the need for space qualification and reliability in detail . **[7]**

b. A satellite is 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. **[7]**

c. State and explain Kepler's three laws of planetary motion. Explain various parameters to describe satellite orbits. **[7]**

Q4) Answer any two questions **[14]**

a. Explain the reference architecture for satellite networks. Explain the concept of onboard connectivity with transparent processing. **[7]**

b. A satellite transponder has a bandwidth of 36 MHz and uses QPSK modulation with a roll-off factor of 0.25. Calculate the maximum symbol rate and data rate if the system uses FEC rate 3/4. **[7]**

c. Describe the main characteristics of LEO satellite orbits and compare them with GEO orbits. Calculate the orbital period of a LEO satellite at an altitude of 1000 km. **[7]**

Q5) Answer any two questions **[14]**

a. Explain the operational design of the Iridium satellite constellation. **[7]**

b. Discuss the principles of satellite radio broadcasting. Differentiate broadcasting and multicasting. **[7]**

c. Explain how satellites are used in weather forecasting and environmental monitoring. **[7]**

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -
This Question Paper may be distributed for following Subjects as common code.
सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

1] (1154) B.Tech. CBCS (83823) Satellite Communication Part 4 SEM 7
2] (101) Bachelor of Engineering (84049) Satellite Communication Part 4 SEM 7