

Roll No:

BTECH

(SEM. VI) THEORY EXAMINATION 2025-26

SATELLITE COMMUNICATION

TIME: 3 HRS

M.MARKS: 70

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt all questions in brief.

02 x 7 = 14

Q no.	Question	CO	Level
a.	Illustrate the difference between geosynchronous orbit and geostationary orbit with suitable diagram.	1	K1
b.	State Kepler's second law of planetary motion.	2	K2
c.	Define look angle and azimuth angle.	2	K2
d.	Elaborate the earth station parameters affecting the C/N ratio.	3	K2
e.	The noise figure of an amplifier is 3dB. Calculate its equivalent noise temperature. Assume the room temperature to be 290K.	4	K3
f.	List the various block of a GPS receiver.	4	K2
g.	What are the advantages of PSLV?	5	K1

SECTION B

2. Attempt any three of the following:

07 x 3 = 21

Q no.	Question	CO	Level
a.	Describe the different types of satellite orbits with advantages and limitations.	1	K1
b.	Write the advantages and disadvantages of geostationary orbit. A satellite moving in a highly eccentric Molniya orbit having the farthest and the closest points as 35000km and 500km respectively from the surface of the earth. Determine the orbital time period and the velocity at the apogee and perigee points.	2	K3
c.	Derive the expression for power received by the receiver in a satellite link in terms of effective aperture area of receiver antenna. Explain the terms power flux density and Effective Isotropic Radiated Power (EIRP) in context to satellite link design.	3	K3
d.	Discuss briefly about VSAT? Explain the VSAT system with block diagram.	4	K2
e.	Demonstrate the mechanism of satellite launching and also discuss the significance of launching a satellite from west to east.	5	K2

SECTION C

3. Attempt any one part of the following:

07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss in detail the factors that affect the uplink design and the downlink design in geostationary satellites? How the uplink design different than the downlink design?	1	K2
b.	Enlist the elements of satellite communication. Elaborate each element with befitting block diagram.	1	K2



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4. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Elaborate the terms perigee and apogee in the context of satellite motion. A satellite is in an elliptical orbit with a perigee at 1000 km and apogee of 4000 km. Using mean radius of earth to be 6378.14 Km. Find the period of orbit in hours, minutes and seconds and also calculate eccentricity of the orbit.	2	K3
b.	Discuss the effects of orbital parameters on communication system performance.	2	K2

5. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Discuss in brief the various segments of a satellite system. Demonstrate each segment with the help of suitable diagram.	3	K2
b.	Explain the Telemetry, Tracking and Command (TT&C) system.	3	K2

6. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Illustrate the working of Direct Broadcast Satellite (DBS) television network. Also explain the components required to set up a DBS system.	4	K2
b.	What are the various antennas used in satellite communication?	4	K2

7. Attempt any one part of the following: 07 x 1 = 07

Q no.	Question	CO	Level
a.	Explain intelligent testing and control systems in space missions.	5	K2
b.	Explain the history and development of Indian satellite systems under Indian Space Research Organization (ISRO).	5	K2