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BTECH
(SEM VI) THEORY EXAMINATION 2021-22
SATELLITE COMMUNICATION

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If you require any missing data, then choose suitably.**SECTION A****1. Attempt all questions in brief.****2*10 = 20**

Qno	Questions	CO
(a)	Explain Sun-synchronous orbits.	1
(b)	Illustrate the difference between geosynchronous orbit and geostationary orbit with suitable diagram.	1
(c)	“All the major launching sites are situated close to equator”. Justify.	2
(d)	Explain Sun Transit Outage in satellite systems with a diagram	2
(e)	Discuss the factors responsible for various orbital effects.	3
(f)	Explain the significance of Telemetry, Tracking and Command System.	3
(g)	List the various block of a GPS receiver.	4
(h)	Explain the need of P and C/A codes in GPS Segment.	4
(i)	List the features of cryogenic engines in context to GSLV.	5
(j)	Identify the various types of launch vehicles developed so far by ISRO.	5

SECTION B**2. Attempt any three of the following:****10*3 = 30**

Qno	Questions	CO
(a)	Analyze the history and achievements of satellite communication systems in world.	1
(b)	Identify the various orbital elements that define a satellite's orbit. Support your answer with suitable diagrams.	2
(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
(d)	Illustrate the implementation of VSAT Systems and their significance.	4
(e)	Demonstrate the mechanism of satellite launching and also discuss the significance of launching a satellite from west to east.	5

SECTION C**3. Attempt any one part of the following:****10*1 = 10**

Qno	Questions	CO
(a)	Demonstrate the various types of orbits for satellites. Depict the position of various orbits with a diagram. List the advantages of placing the satellites in these orbits.	1
(b)	Discuss the various types of satellites. Also discuss the advantages and applications of the satellites.	1

4. Attempt any one part of the following:**10 *1 = 10**

Qno	Questions	CO
(a)	Discuss the Kepler's second law of planetary motion. Explain points of perigee and apogee. A satellite is moving in an elliptical orbit with point of perigee at 800 km and point of apogee at 2300 km. Determine:	2



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	(i) Velocity at perigee and apogee (iii) Time period of satellite Take radius of earth to be 6375 Km.	
(b)	Illustrate the significance of look angles for a satellite using a suitable diagram. Explain the relation to determine the elevation angle and azimuth angle. An earth station is located at 30° West longitude and 50° North latitude. Determine the earth station azimuth and elevation angles with respect to geostationary satellite located at 50° West longitude. (Assume orbital radius: 42764 km and earth's radius 6360 km).	2

5. Attempt any one part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Discuss in brief the various segments of a satellite system. Demonstrate each segment with the help of suitable diagram.	3
(b)	Explain the significance of C/N ratio and G/T ratio for a satellite system. A satellite carrying a 17 GHz continuous wave (CW) beacon transmitter is located in geosynchronous orbit 42000 km from an earth station. The beacon's output power is 0.3 W, and it feeds an antenna with 18.9 dB gain towards the earth station. The earth station receiving antenna aperture efficiency is 65 percent. The effective aperture area is 20m ² . Determine: (i) EIRP (ii) Path loss (iii) Receiving antenna gain	3

6. Attempt any one part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Briefly discuss the position location principle of GPS with a diagram and relevant equations. Also discuss the various GPS codes and their generation.	4
(b)	Illustrate the working of Direct Broadcast Satellite (DBS) television network. Also explain the components required to set up a DBS system.	4

7. Attempt any one part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Discuss the history of Indian Satellite Systems and the major achievements in the field of Space. Also discuss the formation of ISRO.	5
(b)	Discuss the various generations of Space launch vehicles used by India. Also discuss the specifications of GSLV MK-III in detail.	5