Registration No :

Total Number of Pages : 02   **B.Tech**
                                                                                     PEI7J003

7th Semester Regular / Back Examination 2019-20
SATELLITE COMMUNICATION
BRANCH : AEIE, EIE, IEE
Max Marks : 100
Time : 3 Hours
Q.CODE : HRB029
Answer Question No.1 (Part-1) which is compulsory, any EIGHT from Part-II and any TWO from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1   **Only Short Answer Type Questions (Answer All-10)**   **(2 x 10)**
a)   How do the geostationary orbit and a geosynchronous orbit differ?
b)   Write the most common bipropellents used for thruster operations in satellite sub systems.
c)   What do you understand from perigee and apogee of the satellite orbit?
d)   State Kepler's three law of Planetry Motion.
e)   A satellite is in an elliptical orbit with a perigee of 1000 km and an apogee of 4000 km. Considering the mean earth radius of 6378.14 km. Calculate the period of orbit in hours, min, and seconds.
f)   What do you mean by G/T ratio in satellite communication system?
g)   Enlist different types of artificial satellite as per range and location.
h)   Why equatorial launch of satellite is preferred over any other type of launch?
i)   Why pre-emphasis and de-emphasis are used in FM transmission.
j)   Explain the various frequency bands used for satellite communication.

Part- II

Q2   **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**   **(6 x 8)**
a)   Explain How a satellite continuous to be in orbit and drive the expression for orbital period.
b)   Explain briefly the orbital parameters required to determine the satellite orbit.
c)   Calculate the gain of a parabolidal antenna with diameter of 2.14m operating at a frequency of
     11.45GHZ. Assume an aperture efficiency of 68%.
d)   Explain atmospheric and ionspheric losses in satellite communication.
e)   What do you mean by noise temperature and how it is related with noise figure?
f)   Enlist various types of launch vehicles. Why these launch vehicles are required for satellites?
g)   Briefly discusses various types of antenna used in satellites.
h)   Describe Carson's Rule of bandwidth of FM signals.
i)   Briefly Explain the spade system with neat diagram.
j)   Explain personal communication system using LEO satellites.
k)   Illustrate the differences between LEO, MEO and GEO satellites.
l)   Briefly describe a typical frame structure in TDMA. How do you define TDMA frame efficiency?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 What do you mean by look angles of earth station for a GEO satellite? Explain it using suitable schematics. If any earth station is located at 60^0E, 30^0N. Determine the look angles and range of geostationary satellite at 90^0 E. **(16)**

Q4 Explain in detail the Telemetry, Tracking, Command and Monitoring (TTCM) satellite subsystem with neat block diagram. **(16)**

Q5 A low earth orbit satellite is in a circular polar orbit with an altitude of 2000 km. A transmitter on the satellite has a frequency of 3.45 GHz. Consider the mean earth radius of 6378.14 km. Find **(16)**
   a) The velocity of the satellite in orbit.
   b) The component of satellite velocity vector towards an observer sitting at an earth station as the satellite appears over the horizon.
   c) The Doppler shift of the received signal at the earth station.

Q6 How Attitude and Orbit control is achieved in satellite? Explain it using spin stabilization with suitable diagram **(16)**