



**P.E.S. College of Engineering, Mandya - 571 401**  
 (An Autonomous Institution affiliated to VTU, Belagavi)  
**Eighth Semester, B.E. - Electronics and Communication Engineering**  
**Semester End Examination; June - 2017**  
**Satellite Communication**

Time: 3 hrs

Max. Marks: 100

*Note: i) Answer FIVE full questions, selecting ONE full question from each unit.  
 ii) Missing data, if any, may be suitably assumed.*

**UNIT - I**

- 1 a. State Kepler's three laws of planetary motion with their mathematical formulations. 10  
 b. Distinguish Geo Stationary and Geo Synchronous satellites. 5  
 c. A satellite moving in an elliptical eccentric orbit has the semi major axis of the orbit equal to 16,000 km. If the difference between this apogee and the perigee is 30,000 km, determine the orbit eccentricity. 5
- 2 a. Define Keplarian elements. 5  
 b. What are the look angles for the satellite? With the help of suitable diagram and mathematical equations, explain how look angles are determined? 10  
 c. 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. 5

**UNIT - II**

- 3 a. What is Transponder in a satellite? Explain the difference between linear bent pipe transponder and base band type transponder. 6  
 b. Compare spin and 3 axis stabilization. 6  
 c. In a satellite system, it is proposed to transmit 1800 telephone channels through the satellite transponder. Determine the bandwidth requirement of the transponder. Peaking factor being 10 dB. The starting frequency of 10 kHz. 8
- 4 a. What is meant by DBS service? With a block diagram, explain home terminal for DBS TV/FM reception. 10  
 b. With a block diagram, explain the functioning of transmit receive earth station. 10

**UNIT - III**

- 5 a. Explain the pre assigned FDMA considering three earth stations transmitting and receiving simultaneously through the same satellite transponder. 10  
 b. Explain the acquisition of a carrier in a CDMA system that makes use of the auto correlation function. 10

6. a. With a neat diagram, explain the working of spade system. 6
- b. Explain the frame and bursts format for a TDMA system. 8
- c. The code waveform in a CDMA system spreads the carrier over the full 36 MHz bandwidth of the channel and the roll off factor for the filtering is 0.4. The information bit rate is 64 kb/s and the system uses BPSK. Calculate the processing gain in decibels. Given that the BER must not exceed  $10^{-5}$ , give an estimate of the maximum number of channels that can access the system. 6

#### UNIT - IV

- 7 a. How G/T of an earth station is related to C/N at the earth station. 10
- b. Explain the following transmission losses :
- i) Feeder losses 10
- ii) Antenna misalignment losses
- iii) Fixed atmospheric losses and ionospheric losses.
- 8 a. Explain the “Bent pipe” satellite relays system with its layer architecture. 10
- b. Explain what is meant by split TCP connections and why these might be considered undesirable for Internet use? 10

#### UNIT - V

- 9 a. Explain in detail, the working of MPEG-2 encoder paths. 10
- b. With a block schematic, explain the home receiver indoor unit (IDU). 10
- 10 a. Describe the operation of VSAT system. 10
- b. Describe the operation of Iridium satellite. Also give details about its physical characteristics. 10

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