Paper Code: EEC021 **Roll No.** | | | | | | | | | | |

B. Tech.
(SEM -VII) ODD SEMESTER EXAMINATION 2015-16
SATELLITE COMMUNICATION

[Time: 3 hrs.] **[Max. Marks: 100]**

Note- ***Attempt all questions. All Questions carry equal marks.***

Q1.Attempt any **FOUR** parts of the following: **[4x5=20]**

a) Derive an equation to show that the Kepler's Laws are true for a satellite in geosynchronous orbit.
b) Why the uplink frequency is different from the downlink frequency? Also give the reason to keep higher uplink frequency.
c) Define and explain Elevation and Azimuth angles of a ground station antenna for communication with an orbiting satellite.
d) The apogee and perigee of an elliptical satellite orbits are 3000 Km and 200 Km. determine the eccentricity, semi-major axis and semi-minor axis.
e) Distinguish between geo-synchronous and geo-stationary types of satellite.
f) Explain the different steps involved in launching a geo-stationary satellite.

Q2. Attempt any **FOUR** parts of the following: **[4x5=20]**

a) What is the need of attitude and orbit control? Explain it.
b) What is the function of transponder? Draw and discuss its block diagram.
c) What is the propulsion subsystem? Explain its constituent and their function?
d) Derive the complete link design equation.
e) A satellite is positioned at a distance of 38000 km from the surface of earth and radiates a power of 3W in the direction of earth station. If the satellite antenna gain is 20 dB, determine:
   (i) Flux density at earth station. (ii) Power received by antenna of effective area $8m^2$.
f) What do you understand by G/T ration? Prove that C/N at the input of a detector in the receiver is proportional to G/T.

Q3. Attempt any **TWO** parts of the following: **[2x10=20]**

a) What are the different losses that a propagating wave suffers in the case of a satellite link?
b) Discuss the raindrop distribution in terms of attenuation and depolarization.
c) Describe the operation of a typical VSAT system. State briefly where VSAT systems find widest application.

Q4. Attempt any **TWO** parts of the following: **[2x10=20]**

a) What is GPS? How does GPS satellite navigation work?
b) Draw the block diagram of outdoor unit of a DSB home receiver? Explain the function of each block briefly.
c) Discuss the Satellite Signal Acquisition.

Q5. Attempt any **TWO** parts of the following: **[2x10=20]**

a) Discuss the classification and characteristics of Mobile Satellite Antennas.
b) Explain Wire Quadrifilar Helix Antenna (WQHA) for hand held terminals.
c) Discuss the antenna systems for Mobile Satellite Broadcasting.