



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 121854**

Roll No.

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## B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15  
SATELLITE COMMUNICATION

Time : 2 Hours]

[Total Marks : 60

- NOTE :** (1) Attempt all questions.  
(2) All question carry equal marks.

- 1 Attempt any four parts of the following :  $4 \times 5 = 20$
- (a) Explain Kepler's law of planetary motion. How are these applied to the case of geostationary satellite?
  - (b) The apogee and perigee of an elliptical satellite orbits are 3000Km and 200Km. Determine the eccentricity, semi-major axis and semi-minor axis.
  - (c) The orbital period of a satellite is 650 min. determine the semi-major axis of the elliptical orbit.

- (d) Explain what is meant by geostationary orbit. How do the geostationary orbit and geosynchronous orbit differ ?
- (e) What is advantage of satellite communication over optical fiber communication?
- (f) The two satellite are moving in different elliptical orbit with the same perigee but different apogee distance the semi-major axis of two orbits are 16000Km and 24000Km. Determine the orbital period of a satellite 2 if the orbital period of satellite 1 is 600 min.

2 Attempt any four parts of the following :  $4 \times 5 = 20$

- (a) Explain how a satellite is placed into a geostationary orbit?
- (b) Explain why downlink frequency should be lower than uplink frequency?
- (c) Draw the block diagram of satellite communication system. Explain each part of them.
- (d) What is earth sensor and sun sensor?
- (e) Explain the need of Attitude and orbit control in satellite?
- (f) Determine the average angular velocity of a satellite moving in an elliptical orbit. If the semi-major axis is 42164.8 km and orbital eccentricity is 0.0011 given that  $G = 6.67 \times 10^{-11}$  and  $M = 5.98 \times 10^{28}$ .

3 Attempt any two parts of the following :  $2 \times 16 = 20$

- (a) What is look angle? Explain in detail azimuth angle and elevation angle.
- (b) Draw the block diagram of satellite subsystem. Explain power supply system.
- (c) An earth station situated in the dockland of London England needs to calculate the look angle to a geostationary satellite in Indian Ocean operated by Intelsat. The details of earth station site and satellite are as follows: Earth station latitude and longitude are  $52.0^\circ$  and  $0^\circ$  and satellite longitude longitude (subsattellite point) is  $66.0^\circ E$ .