UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, April 2018

Program: **B. Tech ASE-AVE**	Semester – VIII
Subject (Course): Satellite Communication	Max. Marks : 100
Course Code : ELEG 307	Duration : 3 Hrs
No. of page/s: 02	

*Note: 1) **Answer** in **brief** and to the **points**.*
*2) Diagrams must be **neat** and **clear**.*

Attempt all questions.

Part A [4×5 = 20]

1. Find the velocity of a satellite in geo stationary orbit.

2. Compute the total C/N of a satellite link. The value of carrier to noise ratio for uplink and downlink are 15 dB and 20 dB respectively.

3. Briefly describe the process (with suitable block diagram) of the transmission of a baseband signal from earth station to satellite in space.

4. Comment on the salient features of a geo stationary orbit? Which space centres in India is responsible for its tracking and fabrication of launch vehicle?

Part B [4×10 = 40]

5. Write the formula of Kepler laws of motion with respect to a geo stationary satellite along with the trajectory of the satellite. From the suitable formula calculate the height of a circular orbit in which the satellite took 12 hours for one complete revolution of Earth.

6. How a communication satellite in geo stationary orbit is satellite is placed in its orbit right from the launching site. Describe briefly with a neat diagram. Label all the orbits in which the transaction of satellite took place.

7. Draw the block diagram of a double stage transponder system. Also discuss its operation.

8. What is satellite coverage angle? Calculate the latitude in North and South hemisphere coverage in degree of a geo stationary satellite if the tilt angle of the antenna is 7 degree.

<p align="center">Part C   [15+15+10]</p>

9. A satellite is revolving over the equator in an elliptical path around the earth. If it takes 10 hours in one complete revolution, then compute its altitude at the perigee point and the apogee point and speed at the two points in kmph.

     The perigee to apogee point distance $= 5:3$
     The value of geo centric constant $= 4 \times 10^5 \text{ km}^3/\text{s}^2$.
     The radius of the earth equatorial plane $= 6400$ km

10. Compute the downlink C/N of a Geo stationary satellite with the following specification.

Satellite transmitted power	=	50 W
Gain of the transmitted antenna	=	10
Gain of the received earth antenna	=	12
Transponder bandwidth	=	400 MHz
Downlink loss	=	201 dB
Boltzmann constant	=	- 226 dB
Noise temperature	=	5K

11. Consider X and Y are the two last/extreme points in the north hemisphere and south hemisphere respectively, up to which signals from a geo stationary satellite can be located. If a signal is send from X to the geo stationary satellite at 02:20:20 AM, then when will be it received at Y from the satellite?

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