

<b>Name:</b>	
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2018**

**Course: Satellite Communication** **Semester: VII**  
**Programme: B. Tech Electronics Engineering**  
**Time: 03 hrs.** **Max. Marks: 100**

**Instructions:**      **Attempt all question**  
**Diagrams must be neat and clean**  
Radius of earth at equator =  $6400 \times 10^3$  m.  
Gravitational constant =  $6.67 \times 10^{-11}$  m<sup>3</sup> kg<sup>-1</sup> s<sup>-2</sup>  
Velocity of EM wave =  $3 \times 10^8$  m s<sup>-1</sup>

**SECTION A**

S. No.		Marks	CO
Q 1	Briefly describe the <b>process</b> (with suitable block diagram) of the transmission of a <b>baseband signal from earth station to satellite</b> in space.	5	CO1
Q 2	Comment on the <b>suitable choice</b> of <b>digital modulation</b> technique employed in satellite communication.	5	CO3
Q 3	Calculate the <b>velocity</b> of a satellite in <b>geo stationary orbit</b> .	5	CO4
Q 4	What are the characteristics of a <b>geo stationary orbit</b> ? Which space centers in India are responsible for the <b>tracking</b> of satellite in this orbit?	5	CO2

**SECTION B**

Q 5	Consider A and B are the <b>two extreme points</b> 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 <b>A</b> to a <b>geo stationary satellite at 00:10:10 hrs</b> , then when will be it <b>received</b> at <b>B</b> from the satellite?	10	CO3
Q 6	Describe the various stages in the <b>placement</b> of a satellite from the <b>launching site</b> to the desired <b>geo stationary orbit</b> . State with valid reason the choice of launch site and launch vehicle.	10	CO1
Q 7	Briefly describe the operation of a <b>single stage transponder system</b> . Illustrate the transponder link with the help of suitable diagram.	10	CO2

Q 8	<p>What is satellite <b>coverage angle</b>? Calculate the extreme latitude in North or South hemisphere that can be in coverage of a geo stationary satellite. Consider the tilt angle of the antenna to be 4 degree.</p>	10	CO4
<b>SECTION-C</b>			
Q 9	<p>Compute the <b>downlink C/N</b> of a satellite with the following specification.</p> <p style="margin-left: 40px;"> Satellite transmitted power = 40 W  Gain of the transmitted antenna = 10 dB  Gain of the received earth antenna = 12  Transponder bandwidth = 400 MHz  Downlink frequency = 11 GHz  Boltzmann constant = - 226 dB  Noise Temperature = 8K  Antenna alignment loss = 2 W  Feeding loss = 2 dB </p>	20	CO3
Q 10	<p>A satellite is revolving over the equator in an <b>elliptical path</b> around the earth. If height of the satellite at the apogee is <b>5 times</b> than that at perigee. Compute its altitude and speed at these two points in kmph.</p> <p style="margin-left: 40px;"><b>Semi-major axis</b> of the elliptical orbit = 18400 km</p> <p>What be the <b>velocity</b> of the satellite if the <b>two focus</b> of the mentioned elliptical orbits become one.</p>	20	CO4