

21/5/16

M.C. EATC sem II old May 2014
Sub - Sat. Comm. System.

QP Code : **BB-12451**

(3 Hours)

[Total Marks : 100

- N. B. :** (1) Question No. 1 is compulsory.
(2) Answer any four from remaining.
(3) Assume suitable data wherever required and justify the same.

1. (a) Explain what do you mean by 'Launch window' ? 20
(b) Why is it more prudent to launch a satellite from a point closer to an equator?
(c) Explain why an omni directional antenna must be used aboard a satellite for telemetry and command during the launch phase. How is the satellite powered during this phase ?
(d) What do you understand by :-
(i) Bandwidth limited system, and
(ii) A power limited system.
2. (a) What are Look angles ? Derive an equation for the same. 8
(b) Explain :- 12
(i) Preamble and Postamble.
(ii) Carrier and Uniqueward recovery.
3. (a) How does a satellite go through an eclipse ? Explain with diagram. Discuss the phenomenon of Sun Transit Outage. Explain why it is preferable to operate with a satellite positioned at west rather than East of the Earth station. 10
(b) Draw a block diagram for transmit-receiver type earth station. Explain each block. How can parabolic reflectors used in satellite communication to enhance the gain of antennas. 10
4. (a) Explain the design and functionality of a travelling wave tube amplifier. Discuss the design considerations of a communication satellite. 10
(b) Compare the performance of the various types of tracking system used in earth station. Suggest a suitable tracking system for the following earth station, stating the reason for your choice :- 10
(i) A - type earthstation in polar designs of Earth.
(ii) A - type earthstation in mid-latitude regions of earth.
(iii) A medium - sized ship earth stations.
5. (a) What are different types of repeaters ? Explain any one with neat-diagram. 10
(b) Explain ALOHA Scheme. 10

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6. (a) Explain why the low noise amplifier of a receiving system is placed at the antenna end of the feeder cable. Explain what is meant by :- 12
- (i) Antenna noise temperature
 - (ii) Amplifier noise temperature
 - (iii) System noise temperature
 - (iv) Noise factor.
- (b) The EIRP from a satellite is 49.4 dBW. 8
Calculate :-
- (i) The power density at a ground station for which the range is 40,000 km.
 - (ii) The power delivered to a matched load at the ground station receiver if the antenna gain is 50 dB. The down link frequency is 4 GHz.
7. (a) Explain :- (i) GPS, (ii) VSAT, (iii) Satellite Radio. 10
- (b) Explain :- (i) Lens Antennas, (ii) Dual-grid Antenna, (iii) Array Antennas. 10
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(3 Hours)

[Total Maks : 100

N. B. : (1) Question No. 1 is compulsory

(2) Attempt any **four** questions out of remaining **six** questions.

(3) Assume suitable data wherever necessary

(4) Figures to the right indicate maximum marks

1. (a) What are two port networks? 5
- (b) What is noise figure? Distinguish between thermal and shot noise. 5
- (c) Explain DC biasing networks 5
- (d) Explain in brief the working of quarter wave transformer 5
2. (a) Explain RWH Mechanism in brief. 6
- (b) Explain the domain formation in Gunn diode and derive its expressions for large signal dipole domain analysis. 14
3. (a) Discuss various design considerations of Microwave Amplifier? What is unilateral Figure of merit of an amplifier? 10
- (b) Explain with suitable diagrams, two methods of designing broadband amplifier. 10
4. (a) Using signal flow graph derive the expressions for power gain (G), Available Gain (GA) and Transducer gain (GT) for an amplifier 10
- (b) A GaAs MESFET is measured to have the following s-parameters for a midrange Q-point where $V_{DS} = 5v$, $I_D = 10 MA$ at 10 GHZ With : 10
 $S_{11} = 0.55 \angle -150^\circ$, $S_{12} = 0.04 \angle 20^\circ$
 $S_{21} = 2.82 \angle 180^\circ$ and $S_{22} = 0.45 \angle -30^\circ$
 using this transistor, design a microwave amplifier for maximum power gain at 10 GHz.
5. (a) Draw the equivalent circuit of transmission line and calculate its S - parameters. 10
 prove that its S-matrix is symmetrical and reciprocal.
- (b) Describe in detail dielectric resonance oscillator, its relevant coupling and tuning mechanisms. 10
6. (a) Match using a single stub a load impedance of $75 - j 100 \Omega$, which terminates a 50Ω line. 10
- (b) Convert the h-parameters of two - port n/w into Z, Y and ABCD networks 10
7. Write Short Note on -
- (a) Noise measurement in transistor 5
- (b) Explain the functioning of Hartley oscillator 5
- (c) TRAPATT Diode 5
- (d) Properties of S - parameters 5