



ANDHRAUNIVERSITY

TRANS-DISCIPLINARYRESEARCHHUB

MICROWAVE THEORY AND TECHNIQUES

UNIT-I: Introduction to Microwaves:

Introduction, Applications and Frequency Bands, Microwave Applications: Overview, Microwave Communication Systems, Microwave Components and Systems, GPS and GSM Modules Mobile Phone System, Signal Enhancer / Repeater, RF Energy Harvesting System.

UNIT-II: Microwave Systems:

Spectrum Analyzer- Test Instrument for Signal Measurements, Spectrum Analyzer Architecture - Specifications, Network Analyzer - Test Instrument for Network Measurements, Network Analyzer - Block Diagram, Mobile Phone Jammer / Silencer, Mobile Phone Jammer Architecture, Ground Penetrating Radar (GPR) System.

UNIT-III: Microwave Measurements:

Introduction, Frequency, Power and Phase Noise Measurements, Harmonic Distortion Measurement, IP3 Measurement, Noise Figure Measurement, S-Parameters Measurements, Gain Compression Point Measurement.

UNIT-IV: Mathematical Model of Microwave Antenna Arrays:

Introduction, Arrays of 2 Isotropic Sources - Two Point Sources with Currents Equal in Magnitude and Phase, Two Point Sources with Currents Equal in Magnitudes but Opposite in Phase, Two point sources with currents unequal in magnitude and with any phase, Null Directions for Arrays of N Isotropic Point Sources, Directions of Max SLL for N Elements Arrays, Half-Power Beam width (HPBW) of Array, Grating Lobes for Arrays of N Isotropic Point Sources.

UNIT-V: Microwave Propagation:

Different Modes of Microwave Propagation, Field Strength due to a Space Wave Microwave Propagation, Fundamental equation of a Free Space Microwave Propagation, Critical Frequency, MUF, Virtual Height and Skip Distance, Relation between MUF and Skip Distance.

Text Books:

1. D.M. Pozar, Microwave Engineering, John Wiley & Sons, 2012.
2. K.C. Gupta, et. al., CAD of Microwave Circuits, Artech House, 1981.
3. R.E. Collin, Foundation of Microwave Engineering, McGraw Hill, 2001.
4. S.Y. Liao, Microwave Circuit Analysis and Amplifier Design, Prentice Hall, 1987.
5. J. D. Kraus, Ronald J. Marhefka, Ahmad Khan, Antennas and Wave Propagation, 4th Edition, Tata McGraw Hill, 2017. Computer Networks, A.S.Tannenbaum, PHI- NewDelhi.

Reference Books:

1. Constantine A. Balanis, Antenna Theory: Analysis and Design, Wiley, 4th Edition, 2016.
2. G. Kumar and K.P. Ray, Broadband Microstrip Antennas, Artech House, 2003.
3. RF and Microwave Circuits, Measurements and Modelling - RF and Microwave Handbook, 2nd edition, CRC Press, 2008.



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MODELQUESTIONPAPER

ELECTRONICSANDCOMMUNICATION ENGINEERING

MICROWAVE THEORY AND TECHNIQUES

Exam:3Hrs.

Max.Marks:100

Answer any five questions.
All Questions carry equal marks

1. (a) What are the Microwave Components and Systems and explain briefly.
(b) Briefly explain about GPS and GSM Modules Mobile Phone System.
2. (a) Draw and explain about Network Analyzer - Block Diagram.
(b) Discuss about Mobile Phone Jammer / Silencer
3. (a) Explain about Spectrum Analyzer- Test Instrument for Signal Measurements.
(b) Explain about Spectrum Analyzer Architecture – Specifications.
4. (a) Explain about measurements: i) Frequency, Power and Phase Noise Measurements
ii) IP3 Measurement
5. (a) Derive the expression for Two Point Sources with Currents Equal in Magnitudes but Opposite in Phase.
(b) Explain about Directions of Max SLL for N Elements Arrays, Half-Power Beam width (HPBW) of Array
6. (a) Derive the expression for Two Point Sources with Currents Equal in Magnitude and Phase.
(b) Explain about Grating Lobes for Arrays of N Isotropic Point Sources.
7. (a) Derivation the expression for Field Strength due to a Space Wave Microwave Propagation.
(b) Write a short note on: i) Virtual Height ii) Skip Distance
8. (a) Discuss about different modes of microwave propagation.
(b) Write a short note on: i) Virtual height ii) Critical frequency iii) MUF
