

End Semester Exam Syllabus:

Unit 1: Basics related to Sensors, Actuators, and Transducers. Maxwell's equations in integral and differential forms, their physical significance, and the conversion from integral to differential form (for example, in free space, dielectric, and conducting media). Electromagnetic wave propagation in different media (such as free space, dielectric, and conducting media). All basic concepts related to wave propagation. Fundamental numerical problems based on all the concepts taught in class.

Unit 2: RF Sensors and Measurements: Scattering Parameters for Two-Port Networks, Measurement of S-Parameters (Basics of Vector Network Analyzer - VNA), Properties of S-Parameters (Reciprocal, Symmetrical, Unitary), Basics of Sensors: Types: Planar Sensors, Non-planar Sensors, Important Terms and Their Physical Significance: Sensitivity, Selectivity, Quality Factor (Q-Factor), Return Loss, Insertion Loss, Response Time Recovery Time, Numerical will be based on simple formula covered in class.

Unit 3 Transmission Line Theory:

Introduction to Transmission Lines, Types of Transmission Lines (Coaxial, Microstrip, etc.) Primary Line Constants (R, L, G, C), Lossy, Distortionless, and Lossless Transmission Lines, Characteristic Impedance, Propagation Constant, Voltage and Current Reflection Coefficient & VSWR, Input Impedance, Impedance Matching, quarter wave transformer-based matching.

Important Instructions:

- The coverage for the question paper will be as follows:
 - **Unit 1:** 10-20%
 - **Units 2 and 3:** 80-90%
- The numerical problems will be based on the formulas covered in class and those discussed in the TA sessions, specifically related to the topics mentioned above.
- Please refer to all the uploaded materials for your study.
- S-parameters and Transmission Lines (theory and numerical), you may refer to the uploaded textbook, but only focus on the portions covered in class and TA sessions.