II. *Physical Electronics*

The comprehensive examination in the area of physical electronics centers around the basic topics in physical electronics, including electromagnetic theory, optics and lasers, and semiconductor physics. These include the following.

Electromagnetic Field Theory : electrostatic, magnetostatic, and time-varying electromagnetic fields; energy, forces, torque, and momentum in fields; fields in materials and at boundaries; electromagnetic waves and propagation; transmission lines, microwaves, and antennas.

Optics : Ray, beam, wave and Fourier optics; optical fibers, resonators, and couplers; photon interaction with matter; laser amplifiers and oscillators; optical sources, detectors, couplers, and switches; line-of-sight and fiber communication.

Semiconductor Physics : Band theory, equilibrium carrier concentrations, excess carriers in semiconductors, carrier transport, carrier generation and recombination, semiconductor homojunctions and heterojunctions, field-effect and bipolar transistors, power, optical, and microwave devices.

Recommended SDSU Courses

While many courses in the physical electronics area are helpful as a refresher in preparing for the comprehensive examination, some that directly help the preparation are:

EE 534 Solid State Devices
EE 540 Microwave Devices and Systems
EE 541 Electro-optics