AMITY UNIVERSITY

UTTAR PRADESH

**Course Title: Integrated Optics**

| L | T | P/S | SW/FW | TOTAL CREDIT UNITS |
|---|---|---|---|---|
| 3 | 1 | 4 | 0 | 6 |

**Credit Units: 6**

**Course Level: PG** **Course Code: TELE704**

**Course Objectives:** To teach the basic of integrated optics and their application towards the advancement of communication

**Pre-requisites:** Basic Optics and Electromagnetic Theory

**Course Contents/Syllabus:**

| | **Weightage (%)** |
|---|---|
| **Module I: Optical Waveguide** | **15** |
| Modes in planar waveguide structure, basic three level planar waveguide, symmetric waveguide, asymmetric waveguide, rectangular waveguide, channel waveguide, strip-loaded waveguide. | |
| **Module II: Waveguide fabrication technique** | **20** |
| Deposited thin film, substitutional dopant atom, carrier-concentration-reduction waveguide, epitaxial growth, electrooptic waveguide, oxidation, channel waveguide. | |
| **Module III: Integrated optical devices** | **20** |
| Beam splitters, directional couplers, transverse couplers, tapered couplers, switches, modulators, filters, frequency translators, polarization transformers, electrooptic and acoustooptic modulators. | |
| **Module IV: Integrated optical source** | **25** |
| Basic heterojunction laser structure, performance characteristic of heterojunction laser, control of emitted wavelength, long-wavelength laser, advanced heterojunction laser structure, integrated laser structure, reliability, distributed-feedback laser: fabrication technique, performance characteristics, nanoscale DFB lasers, quantum-well lasers. | |
| **Module V: Integrated optical detectors** | **20** |
| Depletion layer photodiode, waveguide photodiode, schottky-barrier photodiode, avalanche photodiode, metal-semiconductor-metal photodiode, hybrid structure, heteroeptexial growth, factors limiting performance of integrated | |

| | |
|---|---|
| detectors, quantum-well detectors. | |

**Student Learning Outcomes:** The student will be able:

- To explain the concepts, working and applications of Integrated Optics.
- To demonstrate the knowledge of different types of Integrated Optical devices.

To apply the knowledge of Integrated Optical device in modern optical communication technology

**Pedagogy for Course Delivery:** Delivery of lectures with class notes followed by presentations and uploading course material on Amizone

**Lab/ Practicals details, if applicable:**

**List of Experiments:**

- Experiments based on modeling & simulation of Optical Devices

**Assessment/ Examination Scheme:**

| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **Total** |
|---|---|---|
| 67% | 33% | 100 |

**Theory Assessment (L&T):**

| **Continuous Assessment/Internal Assessment** | | | | | **End Term Examination** |
|---|---|---|---|---|---|
| **Components (Drop down)** | Class Test | Home Assignment | S/V/Q | Attendance | End Term Examination |
| **Weightage (%)** | 10% | 10% | 5% | 5% | 70% |

**Lab/ Practical/ Studio Assessment:**

| | **Continuous Assessment/Internal Assessment** | | | | **End Term Examination** | | |
|---|---|---|---|---|---|---|---|
| **Components (Drop down** | **Performance** | **Viva** | **Attendance** | | **Lab Records** | **Practical** | **Viva** |
| **Weightage (%)** | 15% | 10% | 5% | | 10% | 40% | 20% |

**Text Reading:**

1. Robert G. Hunsperger, Integrated Optics: Theory and Technology (Springer)

2. John M. Senior, Optical Communications, (PHI).