INDIAN INSTITUTE OF TECHNOLOGY KANPUR
DEPARTMENT OF PHYSICS

Course Title : **Photonic Devices**

Course No. : **PHY 690V**

Proposed by : **Dr. R.Vijaya**

Prerequisite : **Background of Electromagnetic Theory** (as decided by instructor)

Level : **PG level**

Credits : L-T-P-D-[C] **3-0-0-0-[9]**

Course Contents:

S. No.	Broad theme	Contents	Lectures (of 50 min. duration)
1	Light-matter interaction – a review	Review of wave equation, dispersion, interference and diffraction effects	4
2	Light source	Need for lasers	2
3	Periodic structures as optical devices	Optical multi-layers, diffraction gratings, photonic crystals	6
4	Integrated-optic devices	Coupled-mode theory, waveguides and couplers in silicon platform	6
5	Fiber optic devices	Modal theory, devices for wavelength-, direction- and polarization-selectivity, Bragg gratings	6
6	Electro-optic and optoelectronic devices	Modulators, photodetectors and solar cells	6
7	Novel devices	Plasmonic sensors, slow light devices	5
8	Device characterization	Measurement techniques related to time- and spectral-domain	6

Short summary for including in the Courses of study booklet:

Light-matter interaction – a review, periodic structures such as Bragg reflectors, gratings and photonic crystals, fiber-optic devices, integrated-optic devices, active devices, sensors, measurement and characterization techniques.

Text books and References:

1. Thomas P.Pearsall, Photonics essentials, 2nd Edn, Mc-Graw Hill (2010)
2. R.Menzel, Photonics, Springer (2001)
3. Grote and Venghaus, Fiber optic communication devices, Springer (2001)
4. Zeev Zalevsky and Ibrahim Abdulhalim, Integrated nanophotonic devices, 2nd Edn, Elsevier (2014)
5. Larry A.Coldren, Scott W.Corzine and Milan L.Masanovic, Diode lasers and photonic integrated circuits, 2nd Edn, John-Wiley and Sons (2012)
6. Mark A.Mentzer, Applied optics fundamentals and device applications, CRC Press (2011)
7. A.Dmitriev (Ed.), Nanoplasmonic sensors, Springer (2012)
8. Jacob Khurgin and Rodney Tucker, Slow light, CRC Press (2008)
