Title	**Introduction Quantum Information Laboratory**	Number	QCL6XX0
Department	IDRP-QIC	L-T-P [C]	0–0–4 [2]
Offered for	M.Tech.	Type	Compulsory
Prerequisite			

Objectives

The Instructor will:

1. Introduce the students to quantum information and quantum optics based experiments

Learning Outcomes

The students are expected to have the ability to:

1.Understand and appreciate the experimental aspects of quantum optics and quantum communication.

Contents

Is List of Experiments (related to quantum effects, Bell state measurement, Entanglement generation etc.)

(i) Verification of Malus's law
(ii) Photon Statistics of various sources such as thermal, coherent and single photon using Single Photon Detector,
(iii) Hanbury Brown -Twiss Interferometer
(iv) Generation of Entangled photons using BBO crystal,
(v) Experimental demonstration of BB84 protocol using Pockel Cell
(vi) Design of Optical Homodyne Detection
(vii) Generation of QRNG using single photon(s), i.e. Quantum Resources.
(viii) Test of QNRG with NIST suite, FPGA based symmetric and anti-symmetric QKD generation
(ix) Free space quantum communication up to few meters in lab with single photon and analysis
(x) Optical simulation module for Satellite based communication using MODTRAN

Textbook:

1.) Beck, M., (2012) Quantum Mechanics: Theory and Experiment, Oxford Univ. Press

Reference Books

1.) Alber, G., Beth, Th., Horodecki, M., Horodecki, P., Horodecki, R., Rötteler, M., Weinfurter, H., Werner, R., Zeilinger, A., (2001) Quantum Information, An Introduction to Basic Theoretical Concepts and Experiments, Springer-Verlag
2.) P K Panigrahi, C Mitra, *Use of quantum correlation: A theoretical and experimental perspective*, Journal of the Indian Institute of Science 89 (3), 333-350