MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Name of the Course:	**Laser Technology and its Application in Engineering (910128)**
Proposed By:	Dr. Ashok Kumar Sharma
Department:	Applied Science
Credits:	03

L	T	P
3	0	0

Course Objective:

- Familiarize the students with the concepts of laser
- Understand the applications of laser.
- Acquaint with the various mechanism of lasers

Unit –I

Introduction to quantum behaviour of light , History of laser, Idea of energy levels, population of levels, Absorption and emission of light , Einstein relations with their meaning. Condition of stimulated emission and light amplification, Idea of population Inversion,pumping schemes, classification of lasers, Components of a laser. Two level and three level Laser rate equations.

Unit–II

Optical Gain, Line Broadening Mechanism, Bandswidth, Modes of a laser with emphasis on single mode operation, properties of modes, optimization of output power. Intensity, directionality, monochromaticity, polarization and speckles.

Unit–III

Output control of lasers, Selection of narrow frequency range, Selection of TEM Modes. And single longitudinal modes. Idea of generating high power pulse.

Unit–IV

Concept of Q-factor, Q-switching for obtaining giant pulses, different methods of Q-switching. Cavity dumping, mode locking techniques frequency conversion using non- linear crystals, Idea of tunable Lasers.

Unit–V

Applications of lasers in: Civil, Mechanical, Electrical, Electronics, Laboratory studies, Medical Science, Militaru applications automobiles, Aeronautics and space science.

Course Outcomes: Upon successful completion of the course the student will be able to

CO 1 Identify the basic properties of laser

CO 2 Explain the properties of a Laser viz gain and bandwidth

CO 3 Describe the process of selecting frequency range of Laser

CO 4 Generate an idea about Q factor and tunable lasers

CO 5 Explain laser applications in various fields of engineering

Recommended Books

1. An Introduction to laser theory and Applications, Prof. M.N. Avadhanulu, KITS, Nagpur S.Chand& Company Ltd.
2. An Introduction to lasers Prof. M.N. Avadhanulu, S. chand& Company Ltd.
3. Laser theory and Applications, A. Ghatah & K. Thyagrajan, PHI
4. Lasers: Principles,Types and Applications, K.R. Nambiar, New Age International Publications