P.G. Diploma in Photonics **Prospectus No.20151248**
(One Year- Semester Pattern)

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

PROSPECTUS
OF
The Examination for the Post Graduate Diploma in Photonics (One Year – Semester Pattern)
Semester-I, Winter-2014
Semester-II, Summer-2015 & onwards

2014

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Post Graduate Diploma in Photonics (One Year – Semester Pattern)
(Semester-I & II)

(Prospectus No. 20151248)

SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.

Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.
Ordinance No. 6 of 2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Registrar
Sant Gadge Baba Amravati University

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM

The pattern of question paper as per unit system will be boradly based on the following pattern.

(1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.

(2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.

(3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.

(4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.

(5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.

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SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION

No. : 20 of 2013 Date :09/10/2013

Subject : Examinations leading to Post Graduate Diploma course in Photonics (One Year....Semester Pattern) Direction, 2013.

Whereas, University Grants Commission, New Delhi, vide its letter No.F.14-29/2013 (Inno/ASIST.), dated 30th March, 2013 has granted approval and sanction for release of grants-in-aid to the Department of Physics, Sant Gadge Baba Amravati University for P. G. Diploma in Photonics (One Year....Semester Pattern) under Innovative Programme - Teaching & Research in Interdisciplinary & Emerging areas.

AND

Whereas, Development Section of the University vide its note dated 8.4.2013 has conveyed to prepare the syllabus and other details in consultation with H.O.D. in Physics.

AND

Whereas, the Scheme of Examination, Syllabi and other details has prepared by the Head, P.G. Department of Physics and submitted to the office.

AND

Whereas, the Hon'ble Vice-Chancellor has accepted the Scheme of examination along with syllabus and other details of above said course u/s 14(7) of the Maharashtra Universities Act, 1994 to be implemented from the Academic Session 2013-14 & onwards on behalf of B.O.S. in Physics, Faculty of Science & Academic Council.

AND

Whereas, the Academic Council in its meeting held on 31.08.2013 while considering the item No.49 in respect of action taken u/s 14(7) of the Maharashtra Universities Act, 1994 by the Hon'ble Vice-Chancellor regarding the above said course, has granted approval to the recommendations of B.O.S. in Physics regarding starting of a course as per the Academic Calendar and eligibility criteria.

AND

Whereas, the Scheme of examination and other details are to be regulated by an Ordinance.

AND

Whereas, making of an Ordinance is time consuming process.

AND

Whereas, the admission to above course are to be made in the Academic Session 2013-14.

Now, therefore, I, Dr. M. K. Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:-

1) This Direction may be called, "Examinations leading to Post Graduate Diploma course in Photonics (One Year....Semester Pattern) Direction, 2013."

2) This Direction shall come into force w.e.f. the date of its issuance.

3) Following shall be the Examinations leading to the-

   (i) Post Graduate Diploma in Photonics, Semester-I – Examination.

   (ii) Post Graduate Diploma in Photonics, Semester-II – Examination.

4) Duration of each of the above semester shall be six months with an examination at the end of each semester.

5) (i) The examinations specified in paragraph 3 above shall be held twice in a calendar year at such places and on such dates as may be appointed by the Board of Examinations.

   (ii) Main Examination of Semester-I shall be held in Winter and Supplementary Examination in Summer.

   (iii) Main Examination of Semester-II shall be held in Summer and Supplementary Examination in Winter.

6) Subject to his/her compliance with the provisions of this Direction and of other Ordinance in force from time to time, the following candidates shall be eligible for admission to the Post-Graduate Diploma in Photonics (One Year....Semester Pattern) Examinations namely:-

   Candidates having M.Sc in Physics/Applied Physics/branch that is relevant to Physical Sciences/M.Sc. any subject but necessarily Physics as one of the major subject at Graduation/or B.E./ B.Tech.(Electrical/Electronics /Computer / Information Technology/ Instrumentation/Mechanical) are eligible to apply for the P.G.Diploma course in Photonics.

   Final admissions will be made on the basis of percentage obtained at qualifying examination (60% weightage) and the performance in the "Special Entrance Test" to be conducted by the nodal center each year (40% weightage) of 20 marks.

7) Subject to his/her compliance with the provisions of this Direction and of other Ordinance (Pertaining to examination in General) in force from time to time, the applicant for admission to examination at the end of the course of study of a particular Semester shall be eligible to appear at it, if:

(i) he/she satisfied the conditions in the table and the provisions there under :-

TABLE

Sr.No.	Name of examination	The student should have completed the term satisfactorily	The student should have passed following e examination
1	2	3	4
1	Diploma in Photonics Semester-I	Semester-I	As indicated in Para 6.
2	Diploma in Photonics Semester-II	Semester-II	-------

(**Note** ï (i) Subjects prescribed and numbered in the scheme of Examinations shall be treated as separate subjects, however, the theory and practical, if any, of the subject shall be treated as separate Head of Passing.

(ii) He/ She has complied with provisions of Ordinance pertaining to Examination in general.

(iii) He/ She has prosecuted a regular course of study in University Department/College affiliated to the University.

(iv) He/ She has in the opinion of the Head of the Department/ Principal, shown satisfactory progress in his/her studies.)

8) Papers and the Practicalôs in ówhich an examinee is to examined, maximum marks for these and the minimum pass mark which an examinee must obtain in order to pass in the subject and the examination are detailed in the Examination Scheme appended herewith as **Appendix-A** with this Direction.

9) Examination fees for each semester of the examination and also the practical examination shall be as prescribed by the University from time to time.

10) An examinee who is successful at Semester-I, Semester-II examinations under this Direction and who obtained 75% or more marks in aggregate

of Semester-I, Semester-II Examinations shall be placed in the First Division with Distinction, those obtaining 60% or more but less than 75% shall be placed in the First Division and all other successful examines shall be placed in the Second Division.

11) (i) Scope of the subjects shall be as indicated in the syllabus.
(ii) Medium of instruction and examination shall be English.

12) Provision of Ordinance No.18 of 2001 relating to an Ordinance to provide grace marks for passing in a head of passing and Improvement of Division (Higher Class) and getting distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute No.18 and of Ordinance No.10 relating to Providing for Exemptions and Compartments shall apply to the examination under this Direction.

13) An examinee who does not pass or who fails to present himself/herself for the examination shall be eligible for readmission to the same examination on payment of fresh fees and such other fees as may be prescribed.

14) As soon as possible after the examination, the Board of Examinations shall publish a result of the examinees. The result of the examinations shall be classified as above and merit list shall be notified as per Ordinance No. 6

15) Notwithstanding anything to the contrary in this Direction no one shall be admitted to an examination under this Direction, if he/she has already passed the same examination or an equivalent examination of any Statutory University.

16) Examinees who have passed in all the subject prescribed for Semester-I, Semester-II of the examination of the Diploma course shall be eligible for award of the Post-Graduate Diploma in Photonics (One Year..... Semester Pattern).

Amravati
Date : 08/10/2013

Sd/-
(Dr. M. K. Khedkar)
Vice-Chancellor

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Appendix-A

Scheme of Teaching and Examination for the Post Graduate Diploma in Photonics (One Year - Semester Pattern)

Sr. No.	Sub. Code No.	Paper / Practical No.	Subject	Teaching Scheme in Hours.			Duration of Papers/Laboratory Examination in Hrs	Examination Scheme								Grand Total Marks
								Theory				Practical				
				Theory	Practical	Total Hours / week		Max. Marks Theory Papers	Max. Marks Internal Assessment	Total	Min. Pass Marks	Max. Marks	Max. Marks Internal Assessment	Total	Min. Pass Marks	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Semester-I																
1	1PGDIP1	I	Fundamentals of Photonics	4	-	4	3	80	20	100	40	--	--	--	--	100
2	1PGDIP2	II	Laser Physics	4	-	4	3	80	20	100	40	--	--	--	--	100
3	1PGDIP3	P-I	Laboratory Course-I	-	16*	16*	6	--	--	--	--	80	20	100	40	100
4	1PGDIP4	P-II	Industrial Visits/ Tour/ Interaction/ Training & Seminar -Report				Maximum 45 minis open defense					80	20	100	40	100
			Total	8	16	24		160	40	200	80	160	40	200	80	400
Semester-II																
1	2PGDIP1	III	Optical Fiber and Applications	4	-	4	3	80	20	100	40	--	--	--	--	100
2	2PGDIP2	IV	Non-Linear Optics	4	-	4	3	80	20	100	40	--	--	--	--	100
3	2PGDIP3	P-III	Laboratory Course-II	-	16*	16*	6	--	--	--	--	80	20	100	40	100
4	2PGDIP4	P-IV	Project				Maximum 45 minis open defense					80	20	100	40	100
			Total	8	16	24		160	40	200	80	160	40	200	80	400
															Grand Total of Semester-I & II	800

*** 4 Hours of Laboratory course will be dedicated to Tutorials/Assignments/Demonstration/Discussions and allied activities related to the course of a semester.**

Note: Daily schedule will be 2 Hours Theory and 3 Hours Laboratory / Field work (Monday-Thursday) and on Friday/Saturday 4 Hours of any other curricular activity like test/tutorials etc related work.

Syllabi for Post Graduate Diploma in Photonics

SEMESTER-I

Paper – I (1PGDIP-1)

Fundamentals of Photonics

[Syllabus approved by UGC : Fundamentals of geometrical optics, Ray tracing, paraxial approximation, Aberrations, Designing Optical set-ups, Thin lens theory, Wave propagation, wave particle duality, Kramers-Kronig relations, Electromagnetic fields in homo and inhomogeneous dispersive media, diffraction theory, Polarization of light, Fourier optics, Interference theory, electromagnetic effects, statistical optics, Plain waves, Fourier Transforms in Rectangular and Cylindrical coordinates, Fourier transforms of special functions, Fourier transformable properties of convex lens, spatial frequency approaches in Fourier Optics, Spatial filters, Holography, Coherent and incoherent imaging.]

Unit-wise Scope and Depth of the paper given below:

Unit-I : Maxwellôs equations, Maxwellôs wave equations for a vacuum, solution of the general wave equation, Group and Phase velocity, generalized solution of the wave equation,, transverse electromagnetic wave, flow of electromagnetic energy, electric dipole radiation, Fundamentals of geometrical optics, Ray tracing, paraxial approximation, Aberrations, Designing Optical set-ups, Thin lens theory

Unit-II : Fundamentals of Modern Optics: Wave propagation, wave particle duality, Kramers - Kronig relations, Electromagnetic fields in homo and inhomogeneous dispersive media, diffraction theory, Polarization of light.

Unit-III : Fourier Optics: Plane waves, spatial frequency, Optical Fourier Transform, Diffraction of light, special function in Photonics and their Fourier transform, convex lens and its function, Image formation, spatial filters, Holography, Applications of Holography.

Unit-IV : Near Field optics: The evanescent waves, Goos-Hänchen Shift, generation of evanescent waves, Photon tunneling microscope, scanning near field optical microscope, probes to detect the evanescent field.

Unit-V : Radiation pressure of laser light, Optical Tweezers and its applications, Raman-optical tweezers, Laser cooling of atoms, Bose Einstein Condensate, Atom laser.

References

1. Keigo Iizuka, ñElements of PHOTONICS Vol. 1 (In free space and special media) and 2 (for fiber and integrated optics),ò Wiley Series in Pure and Applied Optics.
2. Eugene Hecht, ñOptics (International Edition),ò Addison Wesley, (2003).
3. F G Smith, T A King and D Wilkins, ñOptics and Photonics: An Introduction,ò John Wiley & Sons, Ltd, San Francisco, USA, (2007).
4. David J. Griffiths, ñIntroduction to Electrodynamics (3rd edition),ò Pearson Publishers.
5. Born and Wolf, ñPrinciples of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light,ò Cambridge University Press.
6. Joseph W Goodman, ñIntroduction to Fourier Optics,ò McGraw-Hill.
7. Hand Book/Optics, Vol. 1-IV, Optical Society of India, McGraw Hill

Paper - II (1PGDIP-2)

Laser Physics

[Syllabus approved by UGC : Atom-Photon interactions, Emission and absorption of radiation, lifetime of excited states, stimulated and spontaneous emission, Einsteinôs coefficients, gain and absorption coefficient, line width of transition, Broadening mechanisms, rate equations, Theory of laser oscillations: steady state oscillations, threshold condition, conditions on population inversion, three and four level system, gain saturation, effect of line profile, pumping mechanism, single and multimode lasers, spectral and spatial hole burning, relaxation oscillation, coherence properties of laser beam, statistical properties of laser beam, optical resonators, Q switching, mode locking, pulse amplifications, limitation on laser output, types of laser (He-Ne, Ar-ion, CO_2, Excimer, dye, Nd-YAG, Ti-Saphhire, and semiconductor)]

Unit-wise Scope and Depth of the paper given below:

Unit-I : Emission and absorption of radiation, lifetime of excited states, stimulated and spontaneous emission, Einstein coefficient of stimulated and spontaneous emission, gain and absorption coefficient, line width of transition, Broadening mechanisms, rate equations.

Unit-II : Theory of laser oscillations: steady state oscillations, threshold condition, conditions on population inversion, three and four level system, gain saturation, effect of line profile, pumping mechanism.

Unit-III : Laser Cavity modes: Longitudinal and transverse modes, Spectral and spatial hole burning, stable curved mirror cavities, ABCD matrices, properties of Gaussian beam, properties of real laser beam. Propogation of Gaussian beams using ABCD matrices.

Unit-IV : Q Switching: Theory and methods of producing Q-Switching within laser cavity, Mode locking: Theory and techniques for producing mode locking, Spectral narrowing, tunable cavity.

Unit-V : Types of laser: He-Ne Laser, Ar-ion laser, CO_2 laser, Excimer laser, dye laser, Nd-YAG laser, Ti-Saphhire laser, and semiconductor laser, free electron laser.

Reference:

1. Claude Cohen-Tannoudji, Jacques Dupont-Roc and Gilbert Grynberg, ñAtom-Photon Interactions: Basic Processes and Applications,ò John Wiley & Sons, Inc., USA (1992).
2. G Herzberg ñAtomic spectra and atomic structure,ò Courier Dover Publications (1945).
3. H E White ñIntroduction to atomic spectra,ò McGraw-Hill Education (1934).
4. William T. Silfvast, ñLaser Fundamentals,ò Cambridge University Press, New York, USA (2004).
5. J Verdyen ñLaser electronicsò
6. Jeff Hecht, ñLaser Guidebook,ò McGraw-Hill Professional, (1999).
7. Marvin J. Weber, ñHandbook of laser wavelengths,ò CRC Press, USA (1999).

Laboratory Course-1 (1PGDIP-3)

PRACTICAL I: (LAB-I): A student should perform at least seven experiments from the following list. In the examination he will be asked to perform one experiment only

1. Handling, cleaning, maintenance of optical components and laser systems. Laser safety demonstration.
2. Characterization of laser beam.
3. Setting up of two and multi-beam Interferometer.
4. Measurement of UV-Visible Absorption spectra of standard samples.

5. To record and study Laser Induced Breakdown spectroscopy signal of known and unknown samples. (Demo)
6. Measurement of refractive index of the transparent material using Mach-Zahnder Interferometer.
7. Microlithography using High power Nd:YAG laser. (Demo)
8. Setting up of high power interferometer.
9. Conversion of continuous wave laser into pulsed laser.
10. To study relaxation oscillation of diode laser.
11. Temporal pulse shaping of laser beam.
12. To study various polarized states of light.

Industrial Visits/ Tour/ Interaction/ Training & Seminar - Report (1PGDIP-4)

Each student has to do internship in industry/R&D centers working in the field of Photonics or to visit at least two industries/R & D Institutes and do interactions/hand on training during the educational tour of about two-four weeks. After completion students will have to prepare a report and present their work (Seminar) in front of internal examiner. Coordinator of the PG Diploma programme and external examiner (preferable from the industry). They will be judge according to their efforts in understanding industrial work.

Expectations:-

Industrial Training (tour of the facilities, hands on experience, discussions with industrial workers, understanding of methodology and guidelines of the industrial processes) is expected in the following fields

- Laser Safety
- Laser handling, cleaning and tuning
- Fabrication and handling and cleaning of optical components
- Fabrication of optical fiber
- Fabrication of optical devices
- Application of Laser machining in industry
- Other Industrial use of laser

SEMESTER-II

Paper – III (2PGDIP-1)

Optical Fiber and Applications

[Syllabus approved by UGC Optical fibers: Classification, total internal reflections, Goos Hanchen shifts, Analysis of optical wave guides- ray and wave optics, characteristic equation of step index fiber, modes and their cut-off frequencies, single and multimode fibers, linearly polarized modes, power distribution, Graded index fiber, propagation constant, leaky modes, power profiles, dispersions, impulse response, types of couplings, Birefringent effects, polarization maintaining fibers, Fabrication techniques, Photonic crystal fiber, Optical Communications: Optical transmitters, Optical receivers, system design and performance, coherent and multi channel light wave systems, optical amplifiers, dispersion compensation, Optical signal processing.

Optical devices: Optical modulators, Optical Transducers, Optical switches, All optical logic gates, Photonic circuits, Optically integrated devices]

Unit-wise Scope and Depth of the paper given below:

Unit-I : Optical fibers: Classification, total internal reflections, Goos Hanchen shifts, Analysis of optical wave guides- ray and wave optics, characteristic equation of step index fiber, modes and their cut-off frequencies, single and multimode fibers, linearly polarized modes, power distribution

Unit-II : Graded index fiber, propagation constant, leaky modes, power profiles, dispersions, impulse response, types of couplings, Birefringent effects, polarization maintaining fibers, Fabrication techniques, Photonic crystal fiber.

Unit-III : Optical Communications: Optical transmitters, Optical receivers, system design and performance, coherent and multi channel light wave systems, optical amplifiers, dispersion compensation, Optical signal processing.

Unit-IV : Optical devices: Optical modulators, Optical Transducers, Optical switches, All optical logic gates, Photonic circuits, Optically integrated devices, Optical sensors.

Unit-V : Optoelectronic devices: Wide bandgap semiconductors, light emitting diodes (LEDôs), Diode lasers, fiber lasers, Wave division multiplexing network optical devices, Advances in waveguides and waveguide devices, Plasmonic waveguides.

Reference:

1. Ajoy Ghatak and K Thyagarajan, ñIntroduction to fiber optics,ò Cambridge University Press (1999).
2. G P Agarwal, ñFiber-Optic Communication systems (second edition),ò
3. Pallab Bhattacharya, ñSemiconductor Optoelectronic devices,ò Prentice Hall (1996).
4. Shun Lien Chuang, ñPhysics of Optoelectronic Devices,ò Wiley Series in Pure and Applied Optics, John Wiley & Sons Ltd. (1995).
5. S. O Kasap, ñOptoelectronics and Photonics: Principles and Practices,ò Pearson Education (2001).
6. Various Research Journal Papers on Optical and optoelectronic devices.

Paper -IV (2PGDIP-2)

Non Linear Optics

[Syllabus approved by UGC Introduction to Non-linear optics, Non-linear optical susceptibility, Kramers-Kronig relation in non-linear optics, origin of non-linearity, Rabi oscillations, wave equation for nonlinear optical media, sum frequency generation, difference frequency generation and parametric amplification, harmonic generation, birefringent phase matching, four-wave mixing, Optical phase conjugation, Intensity dependent refractive index, self-focusing, self-phase modulation, Optical Bistability, pulse propagation and temporal solitons,

Applications of nonlinear optics: Acousto-optics, electro-optics and magneto-optics effects and devices, Optical modulators, Stimulated Brillouin, Rayleigh and Raman Scattering, Optically induced damage and multi-photon absorption, ultra fast optics, pulse width measurement and of ultra fast laser, pulse compression, white light generation and filamentation, Ultrafast machining of materials]

Unit-wise Scope and Depth of the paper given below:

Unit-I : Introduction to Non-linear optics, Non-linear optical susceptibility, Nonlinear Susceptibility of a Classical Anharmonic Oscillator, Properties of the Nonlinear Susceptibility, Time Domain Description of Optical Interactions, Kramers-Kronig relation in linear and non-linear optics, Wave ï Equation Description of Nonlinear Optical Interactions: Coupled wave equations for Sum-Frequency Generation, Manley-Rowe Relations, Sum Frequency Generation, Difference-Frequency Generation and Parametric Amplification, Second Harmonic

Generation, Phase Matching Considerations, Optical Parametric Oscillators, Quasi-Phase Matching.

Unit-II : Quantum mechanical calculation of the nonlinear optical susceptibility, density matrix formalism and perturbation solution, Intensity Dependent Refractive Index: Tensor Nature of the 3rd order Susceptibility, Nonresonant Electronic Nonlinearities, Nonlinearities due to molecular orientation, thermal nonlinear optical effects, semiconductor nonlinearities, Origin of non-linearity, Rabi oscillations and dressed atomic states.

Unit-III : Processes resulting from the intensity dependent refractive index: Self Focusing and other self Action effects, Optical phase conjugation, Optical Bistability and Optical Switching, Two Beam Coupling, Pulse Propagation and Temporal Solitons.

Unit-IV : Applications of nonlinear optics: Acousto-optics, electro-optics and magneto-optics effects and devices, Optical modulators, Stimulated Brillouin, Rayleigh and Raman Scattering, Optically induced damage: Avalanche Breakdown Model, Influence of Laser Pulse Duration, Direct Photo ionization and multi-photon absorption and ionization.

Unit-V : Ultrafast Lasers, Characterization of Ultrafast laser, Pulse width measurement of ultra fast laser (Autocorrelation techniques only), pulse compression, white light generation and filamentation, Ultrafast machining of materials.

Reference:

1. Robert W. Boyd, ñNonlinear Optics,ò Academic Press An Imprint of Elsevier, San Diego, USA (2003).
2. A. Yariv, ñQuantum Electronics,ò Wiley; 3 edition (January 3, 1989).
3. Y. R. Shen, ñNonlinear Optics,ò Wiley-Interscience; 1 edition (Nov 7 2002).
4. B B Laud ñLasers and nonlinear opticsò

Laboratory Course-2 (2PGDIP-3)

PRACTICAL I: (LAB-I): A student should perform at least seven experiments from the following list. In the examination he will be asked to perform one experiment only

1. To set up fiber optic voice communication system.
2. To determine numerical aperture of given optical fiber.
3. Determination of bending loss in multi mode fibers.

4. Magneto optic effect: To determine the angle of rotation as a function of mean flux density using different wavelengths of light and to calculate the corresponding Verdetôs constant in each case.
5. Acousto optic effects: Study of density and elasticity in various liquids.
6. To study Pockelôs effect.
7. Sculpting of plastic optical fiber tip.
8. To fabricate all optical fiber beam splitter.
9. Study of Second Harmonic Generation in crystals.
10. Measurement of axial velocity of ablated particles using beam deflection set up.
11. Pulsed laser deposition of thin films. (Demo)
12. Laser induced forward transfer of thin film material using rear side ablation. (Demo)

Project Work (2PGDIP-4)
(6 Months, Part time)

This is a part time project during the second semester. Each student has to select the topic in consultation with the coordinator and do perform the work under the guidance of competent persons from reputed R & D Institutes/Universities/ Industry. Studentôs work in the form of project thesis will have to be submitted and he/she will be required to give an open defense (Seminar of about 30 min) in front of the external and internal examiners, faculties in the department and other fellow students.

Distribution of marks:

Theory		**Laboratory course**		**Industrial visits/ training/ Internship**		**Project**	
Activity	**Marks**	**Activity**	**Marks**	**Activity**	**Marks**	**Activity**	**Marks**
University examination 5 questions with internal choice (16 Marks each)	80	University Practical Examination work performance	60	Selection of the Industry/ Institute	20	Selection of the topic and Report	20
Internal assessments At least 3 unit tests/ assignments/ seminar or 20 marks each (Average of 2 best of 3 will be selected)	20	Viva Voice	20	Exposure & report evaluation	60	Open defense presentation Evaluation of the report	60
		Internal Assessment+ Record of work	20	Seminar Viva voice	20	Viva voice (Response Feedback)	20

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