

11.Suggested Books

S.No.	Name of Books/ Authors	Year of Publication/ Reprint
1.	Introduction to Nanoscale Science & Technology by M. Di Ventra et al Springer	2004,
2.	Introduction to Nanotechnology by C P Poole Jr and Franks J Owens Willey	2003
3.	Quantum Electronics by A. Yariv Willey	1989
4.	Nanophotonics by Paras N Prasad Willey	2004
5.	Carbon Nanotube Electronics, edited by Ali Javey, Jing Kong, Springer	2009
6.	Physics of Nanostructured Solid State Devices, Supriyo Bandyopadhyay, Published by Springer	2012

S. No.	Contents	Contact Hours (hrs)
1.	Concept of dimensionality of solids, 3D to 0D; Energy band structure in low dimensions, motion of electron in bands, Density of states, Density of Modes, Density of Phonons and Photons,	06
2.	Population of conduction band, Valance band and Fermi levels for 3D, 2D, 1D and 0D system, Quasi Fermi level, Joint Density of States,	08
3.	Quantum dot (QD), Coulomb Blockade Effect in QD, Conductance formula for nanostructures, quantized conductance, Tunnel Resistance for single electron charging, Charging energy model, Ballistic transport, manifestation of electron and photon confinement and its application in the design and development of nanoscale electronic and optical devices.	06
4.	Behavior of low dimension solids under electric and magnetic fields, Symmetric and Landau Guage, Proof of total energy and wavefunction of electrons in 2D or 1D system in perpendicular magnetic Field. Landu Levels, Landau Orbits, Degeneracy of Landau Levels, Landau level filling, Shubnikov-deHass Oscillation, Integer Quantum Hall Effect, Fractional Hall Effect	10
5.	Quantum mechanical treatment of low dimensional solids, Photon and phonon transport, optical absorption, interband absorption, optical properties, inter sub-band transitions, Two dimensional electron gas.	04
6	Applications of nanomaterial, theory of oxygen sensing by ZnO nanostructures, Carbon nanotubes for gas and vapor sensing (NH ₃ , NO ₂ , H ₂ , CH ₄ , SO ₂ , H ₂ S , Carbon nanotube based Biosensor, Field emission properties from nanostructures	08
	Total	42

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|----------------------------------|---|
| 1. Subject Code: EP-417 | Course Title: Photonics |
| 2. Contact Hours : | L : 3 T : 1 P : 0 |
| 3. Examination Duration (Hrs.) : | Theory : 3 Practical : 0 |
| 4. Relative Weight : | CWS : 25 PRS : MTE : 25 ETE : 50 PRE : 0 |
| 5. Credits : | 4 |
| 6. Semester : | 0DD |
| 7. Subject Area : | DEC-5 |
| 8. Pre-requisite : | Knowledge of the basic concepts of optics .
Knowledge of the partial differential equations, their solutions & special functions |

9. Objective :

To provide the in concepts in the area of photonics

10. Details of course :

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S. No.	Contents	Contact Hours
1.	Propagation of EM waves in anisotropic Materials, Uniaxial and biaxial materials, Polarization Devices. Electro optic effects – Kerr and Pockels effects, Amplitude and Phase Modulators, Beam deflection and scanning devices. Magneto-optic effects – Faraday, Cotton-Mouton and inverse Faraday effects, Optical diode and isolator.	12
2.	Interaction of light with acoustic waves, Acousto-optic modulators and beam deflectors and their application to laser, display and printing technologies. Nonlinear interaction of light with Matter, Origin of optical nonlinearities, Second order optical processes (SFG, DFG, SHG and OPA), Frequency converters and their applications, Third order nonlinear optical processes (self action, self focusing, self phase modulation, optical bistability, degenerate four-wave-mixing and phase conjugation)	12
3.	Electric and magnetic dipole transitions, Einstein's transition probabilities, Lifetime and collision broadening of atomic transitions, Doppler broadening, Master amplification, Rate equation for atomic transitions. Microwave solid state measures.	12
4.	Optical resonators and lens waveguides, Lasers and their general characteristics, Resonant cavities and laser modes, Different types of lasers, Sample applications (scientific and technological)	06
Total		42

1. Subject Code: **EP-419** Course Title: **Introduction to Automation and Motion Control**
2. Contact Hours : L : 3 T : 1 P : 0
3. Examination Duration (Hrs.) : Theory : 3 Practical : 0

S.No.	Name of Books/ Authors	Year of Publication/ Reprint
1.	Fundamental of Photonics by Baha E.A., Saleh and M.C. Teich/ John Wiley and Sons	2010
2.	Photonics by Ralf Menzel Springer Verlag	2001
3.	Integrated optics by T. Tamir Springer-Verilog	1975
4.	Nonlinear Optics by Boyd/ Academic Press.	2010
5.	Nonlinear Fiber Optics by Govind Aggarwal/ Elsevier	2013
6.	Optoelectronics and Photonics by S.O. Kasap/Pearson	2010
7.	Optical Electronics by A. Yariv/ Holt Rinehart and Winston	2012

4. Relative Weight : CWS : 25 PRS : 0 MTE : 25 ETE : 50 PRE : 0
5. Credits : 4
6. Semester : ODD
7. Subject Area : DEC-6

DRAFT EP-53