COURSE OUTLINE FOR THE SESSION MAR 24 to JUNE 24

Faculty Name: Mr. Raghavendra R

Course with code: Applied Physics for CSE Stream - BPHYS202

Semester with section: II Sem F Section

MODULE No	Class No	Date planned	Topics proposed to be covered	Portion to be covered in %	Remarks
MODULE 1	1		Basic properties of a LASER beam,	20%	
	2		Interaction of Radiation with Matter		
	3		Einstein's A and B Coefficients,		
	4		Laser Action, Population Inversion, Metastable State,		
	5		Requisites of a laser system, Semiconductor Diode Laser,		
	6		Bar code scanner, Laser Printer, Laser Cooling		
	7		Numerical problems.		
	8		Optical Fiber: Principle and structure		
	9		derivation of Expression for NA, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking		
	10		Numerical problems.		
MODULE 2	11		De- Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy	40%	
	12		Phase Velocity and Group Velocity, Heisenberg's		
	13		Uncertainty Principle and its application		
	14		Principle of Complementarity, Wave Functio		
	15		Time independent Schrodinger wave equation		
	16		Physical Significance of a wave function and Born Interpretation		
	17		Particle inside one-dimensional infinite potential well		
	18		Expectation value, Eigen functions and Eigen Values		
	19		Waveforms and Probabilities		
	20		Numerical problems.		

MODULE 3	21		Matrix form of wave function, Identity Operator, Determination of I|0> and I|1>,	**60%**	
	22		Pauli Matrices and its operations on 0 and 1 states,		
	23		Mention of Conjugate and Transpose, Unitary Matrix U,		
	24		Examples: Row and Column Matrices and their multiplication		
	25		Probability, Orthogonality		
	26		Introduction to Quantum Computing, Moore's law & its end. Single particle quantum interference, Classical &		
	27		Differences between classical & quantum computing, quantum superposition and the concept of qubit.		
	28		Mathematical representation. Summation of probabilities,Representation of qubit by Bloch sphere		
	29		Multiple Qubit Gates Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of, Swap gate, Controlled-Z gate		
	30		Toffoli gate,Accounting for the extra-ordinary capability of quantum computing, Model Realizations.		
MODULE 4	31		Electrical conductivity in metals, Resistivity and Mobility	**80%**	
	32		Concept of Phonon, Matthiessen's rule. Introduction to Super Conductors,		
	33		Temperature dependence of resistivity, Meissner's Effect, Silsbee Effect, Types of Superconductors		
	34		Temperature dependence of critical field		
	35		Quantum Tunneling, High- Temperature superconductivity,		
	36		Josephson Junction, DC and AC SQUIDs		
	37		Applications in Quantum Computing		
	38		BCS theory		
	39		Numerical Problem		
	40		Numerical Problem		
MODULE 5	41		Taxonomy of physics-based animation methods	**100%**	
	42		Frames, Frames per Second, Size and Scale,		
	43		weight and strength, Motion and Timing in Animations		
	44		Constant Force and Acceleration, The Odd rule, Motion Graph		
	45		Numerical Calculations based on Odd Rule		

	46		Examples of Character Animation: Jumping, Walking.		
	47		Descriptive statistics and inferential statistics		
	48		Poisson distribution and Normal Distributions (Bell Curves)		
	49		Monte Carlo Method.		
	50		Numerical Problems		
Lab Experiments	1	Week 1	Wavelength of LASER using Grating	10%	
	2	Week 2	Numerical Aperture using optical fiber	20%	
	3	Week 3	Series and Parallel LCR Circuits	30%	
	4	Week 4	Black Box	40%	
	5	Week 5	Photodiode	50%	
	6	Week 6	Magnetic deflection	60%	
	7	Week 7	Fermi Energy	70%	
	8	Week 8	Planck's Constant	80%	
	9	Week 9	PHET Stimulations	90%	
	10	Week 10	STEP Stimulation	100%	

List of Text Books:

Suggested Learning Resources: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.

2. A Textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.

3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,

4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,

5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.

6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.

7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition,

Pearson Education Asia Pvt. Ltd., New Delhi.

8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition

9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt. Ltd, Delhi 2014.

10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P

11. Natural Hazards, Edward Bryant, Cambridge University, Press, 2nd Edition

12. Natural Hazards by Ramesh .P. Singh, CRC Press, Taylor and Francis group. 13. Disaster Education and Management, Rajendra Kumar Bhandari, Springer, India 2014

14. Principles of Fire Safety Engineering Understanding Fire & Fire Protection, Akhil Kumar Das, PHI Learning , II Edition. 1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.

Web links and Video Lectures (e-Resources):

Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ

Shock waves: https://physics.info/shock/

Shock waves and its applications: https://www.youtube.com/watch?v=tz_3M3v3kxk

Stress-strain curves: https://web.mit.edu/course/3/3.11/www/modules/ss.pdf

Stress curves: https://www.youtube.com/watch?v=f08Y39UiC-o

Oscillations and waves: https://openstax.org › books › college-physics-2e

Earthquakes: www.asc-india.org

Earthquakes and Hazards: http://quake.usgs.gov/tsunami

Landslide hazards: http://landslides.usgs.gov

Acoustics: https://www.youtube.com/watch?v=fHBPvMDFyO8