COURSE OUTLINE FOR THE SESSION MAR 24 to JUNE 23

Faculty Name: Mr. Ramachandra M N

Course with code: Applied Physics for ME Stream - BPHYM202

Semester with section: II Sem E Section

MODULE No	Class No	Date planned	Topics proposed to be covered	Portion to be covered in %	Remarks
MODULE 1	1		**Oscillations:** Simple Harmonic motion(SHM), differential equation for SHM	20%	
	2		Sprigs: Stiffness Factor and its Physical Significance, series and parallel combination of springs (Derivation) Types of spring and their applications.		
	3		Damped oscillations and types of damping		
	4		Engineering applications of damped oscillations		
	5		Theory of forced oscillations		
	6		Resonance, Sharpness of resonance.		
	7		Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves		
	8		Construction and working of Reddy shock tube		
	9		Applications		
	10		Numerical problems		
MODULE 2	11		**Elasticity:** Stress-Strain Curve, Stress hardening and softening	40%	
	12		Poisson's ratio,		
	13		Elastic Moduli, relation between them, mention relation between K, Y and σ,		
	14		Mention the expression for bending moment.		
	15		Beams, bending moment (only expression)- cantilever Applications,		
	16		I section girder and their Engineering		
	17		Elastic materials, Failures of engineering materials		
	18		Fatigue failure		
	19		Brief discussion on factors affecting fatigue such as surface effect, design effect and environmental effects		

	20		Numerical Problems		
MODULE 3	21		Thermo emf and thermo current, Seeback effect	**60%**	
	22		Peltier effect, Seeback and Peltier coefficients, figure of merit		
	23		laws of thermoelectricity		
	24		Expression for thermo emf in terms of T1 and T2,		
	25		Thermo couples, thermopile, Construction and Working of Thermoelectric generators.		
	26		Thermoelectric coolers		
	27		low, mid and high temperature thermoelectric material		
	28		Applications: Exhaust of Automobiles		
	29		Refrigerator, Space Program (RTG		
	30		Numerical Problem		
MODULE 4	31		Cryogenics: Production of low temperature -	**80%**	
	32		Joule Thomson effect Derivation with 3 cases		
	33		Porous plug experiment with theory		
	34		Thermodynamical analysis of Joule Thomson effect		
	35		Liquefaction of Oxygen by cascade process,		
	36		Lindey's air liquefier,		
	37		Liquefaction of Helium and its properties,		
	38		Platinum Resistance Thermometer		
	39		Thermometer, Applications of Cryogenics, in Aerospace, Tribology and Food processing		
	40		Numerical Problem		
MODULE 5	41		Introduction to nano materials	**100%**	
	42		Nanomaterial and nanocomposites.		
	43		Principle, construction and working of X-ray Diffractometer		
	44		Crystallite size determination by Scherrer equation		

	45		Atomic Force Microscopy (AFM): Principle, construction, working and applications		
	46		X-ray photoelectron spectroscopy(XPS),		
	47		Scanning electron microscopy (SEM),		
	48		Transmission electron microscopy		
	49		Numerical Problems		
	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	Combination of Springs in Series and Parallel	40%	
	5	Week 5	Young's modulus of the material of the given bar Uniform Bending.	50%	
	6	Week 6	Rigidity modulus of the Material of the wire using Torsional Pendulum.	60%	
	7	Week 7	Forced Mechanical Oscillations and Resonance.	70%	
	8	Week 8	Resistivity by Four Probe Method.	80%	
	9	Week 9	Young's modulus of the material of the given bar Single Cantilever	90%	
	10	Week 10	Curvature of the given Plano Convex Lens by setting Newton's Rings.	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