

22PYB04 - PHYSICS FOR MECHANICAL ENGINEERING (Mechanical Engineering)					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>PREREQUISITE: Nil</b>					
<b>Course Objective:</b>		<ul style="list-style-type: none"> <li>To update the knowledge about the properties of matter and elements of thermodynamics.</li> <li>To identify knowledge in the field of electromagnetic theory and optics &amp; laser.</li> </ul>			
<b>Course Outcomes</b> The student will be able to		<b>Cognitive Level</b>	<b>Weightage of COs in End Semester Examination</b>		
CO1	Correlate the stress and strain ratio to apply the elasticity for spring materials.	An	20%		
CO2	Discriminate the thermal conductivity of the medium to employing in instrument applications.	An	20%		
CO3	Manipulate the thermodynamic principles for heat engines.	Ap	20%		
CO4	Illustrate concept of electromagnetic theory to design electromagnetic coil.	Ap	20%		
CO5	Appraise the advantages and limitations of laser technology in industrial applications.	Ev	20%		

<b>UNIT I -PROPERTIES OF MATTER</b>	(9)
Elasticity – Hooke’s law Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.	
<b>UNIT II -THERMAL PHYSICS</b>	(9)
Mode of heat transfer-thermal conductivity - Newton’s law of cooling - thermal conduction through compound media (bodies in series and parallel) - thermal conductivity of a good conductor – Forbe’s method-thermal conductivity of bad conductor - Lee’s disc - radial flow of heat-expression for thermal conductivity of rubber - experimental determination - practical applications of conduction.	
<b>UNIT III -ELEMENTS OF THERMODYNAMICS</b>	(9)
Concept of temperature – Heat - Thermodynamics - work – Heat in Thermodynamics – Comparison of heat and work – internal energy - first law of thermodynamics – applications of first law - second law of thermodynamics – the Carnot engine – heat engine – heat pump refrigerator -Third law of thermodynamics.	

<b>UNIT IV -ELECTRO MAGNETIC THEORY</b>	(9)
Force on a moving Charge - Force on a differential Current Element - Force & Torque Magnetization & Permeability - Magnetic Boundary Conditions -Inductance & Mutual Inductance - Time Varying Fields: Faraday's Law - Displacement Current - Maxwell's Equation.	
<b>UNIT V -OPTICS AND LASERS</b>	(9)
Interference: Air wedge – theory – uses – testing of flat surfaces – determination of thickness of a thin wire – Introduction of laser - Properties of laser beams: mono - chromaticity, coherence, directionality and Intensity - Einstein's A and B coefficients derivation - Resonant cavity - Types of lasers – solid state laser (Neodymium) – Gas laser (CO <sub>2</sub> ) – Materials processing – Laser Cutting – Drilling – Welding – Soldering – Industrial Applications.	
<b>TOTAL(L:45) = 45 PERIODS</b>	

<b>TEXT BOOKS:</b>
<ol style="list-style-type: none"> <li>1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2019.</li> <li>2. E.M.Purcell and D.J.Morin, Electricity and Magnetism, Cambridge Univ.Press, 2017.</li> <li>3. A. Marikani, "Materials Science", PHI Learning Private Limited, Eastern Economy Edition, 2019.</li> </ol>
<b>REFERENCES:</b>
<ol style="list-style-type: none"> <li>1. Dattuprasad and Ramanlal Joshi, "Engineering Physics" Tata McGraw hill education, 2016.</li> <li>2. Subrahmanyam N, Brijlal, "A Text Book of Optics" S.Chand&amp; Co. Ltd, New Delhi, 2017.</li> <li>3. M.N.Avathanalu, P.G.Kshirsagar "A text book of engineering physics" S.Chand&amp;company Ltd, 2015.</li> </ol>
<b>WEB LINKS:</b>
<ol style="list-style-type: none"> <li>1. <a href="https://bayanbox.ir/view/7764531208313247331/Kleppner-D.-Kolenkow-R.J.-Introduction-to-Mechanics-2014.pdf">https://bayanbox.ir/view/7764531208313247331/Kleppner-D.-Kolenkow-R.J.-Introduction-to-Mechanics-2014.pdf</a>.</li> <li>2. <a href="https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf">https://physicaeducator.files.wordpress.com/2017/11/electricity_and_magnetism-by-purcell-3ed-ed.pdf</a>.</li> <li>3. <a href="https://rajeshvcet.home.blog/regulation-2021/ph3151-engineering-physics-study-materials/">https://rajeshvcet.home.blog/regulation-2021/ph3151-engineering-physics-study-materials/</a></li> <li>4. <a href="https://zenodo.org/record/243407#.ZEgPZXZBzIU">https://zenodo.org/record/243407#.ZEgPZXZBzIU</a></li> <li>5. <a href="https://farside.ph.utexas.edu/teaching/qmech/qmech.pdf">https://farside.ph.utexas.edu/teaching/qmech/qmech.pdf</a>.</li> <li>6. <a href="https://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf">https://web.pdx.edu/~pmoeck/phy381/workbook%20nanoscience.pdf</a>.</li> </ol>

Mapping of COs with POs / PSOs														
COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
2	3	-	2	-	-	-	2	-	-	-	-	-	-	-
3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
4	3	-	3	-	-	-	-	-	-	-	-	-	-	-
5	3	-	-	-	-	2	2	-	-	-	-	2	-	-
<b>CO (WA)</b>	<b>3</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>0</b>

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