### LESSON PLAN

**Name of the Subject:** ENGINEERING PHYSICS  (14BT1BS01)

**Class & Semester:** B.Tech I Year

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topic</th>
<th>No. of periods</th>
<th>Book(s) followed</th>
<th>Topics for self study</th>
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</thead>
<tbody>
<tr>
<td><strong>UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY</strong></td>
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<tr>
<td>1.</td>
<td><strong>Lasers:</strong> Introduction, characteristics of laser</td>
<td>1</td>
<td>T1</td>
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<td>2.</td>
<td>Principles of lasing action</td>
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<td>3.</td>
<td>Spontaneous and stimulated emission of radiation</td>
<td>1</td>
<td>T1</td>
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<td>4.</td>
<td>Einstein’s coefficients</td>
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<td>5.</td>
<td>Population inversion</td>
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<td>6.</td>
<td>Ruby laser</td>
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<td>7.</td>
<td>Helium-Neon laser</td>
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<td>8.</td>
<td>Semiconductor laser</td>
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<td>9.</td>
<td>Applications of lasers</td>
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<td>10.</td>
<td><strong>Fiber optics:</strong> Introduction, Construction and working principle of optical fiber</td>
<td>1</td>
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<td>11.</td>
<td>Acceptance angle, acceptance cone and numerical aperture</td>
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<td>12.</td>
<td>Types of optical fibers and refractive index profiles</td>
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<td>13.</td>
<td>Attenuation and losses in fibers</td>
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<td>14.</td>
<td>Optical fiber communication system</td>
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<td>15.</td>
<td>Applications of optical fibers in sensors and medicine</td>
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<td>16.</td>
<td><strong>Holography:</strong> Introduction, construction of a hologram</td>
<td>1</td>
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<td>17.</td>
<td>Reconstruction of image from hologram, applications</td>
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<tr>
<td>18.</td>
<td>Problems</td>
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<td><strong>Total periods required:</strong></td>
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<td><strong>18</strong></td>
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</table>

**UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY**

<table>
<thead>
<tr>
<th>S. No.</th>
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<tbody>
<tr>
<td>19.</td>
<td><strong>Special Theory of Relativity:</strong> Introduction, absolute frame of reference</td>
<td>1</td>
<td>T1</td>
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<td>20.</td>
<td>Time dilation, length contraction</td>
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<td>T1</td>
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<td>21.</td>
<td>Addition of velocities</td>
<td>1</td>
<td>T1</td>
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<tr>
<td>22.</td>
<td>Mass-energy equivalence, energy-momentum relation</td>
<td>1</td>
<td>T1</td>
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</tbody>
</table>
### Acoustics of Buildings
- **Introduction, Basic requirement of acoustically good hall**
- **Reverberation and time of reverberation, Sabine’s formula for reverberation time (qualitative treatment)**
- **Absorption coefficient of Sound and its measurement, factors affecting the architectural acoustics and their remedies.**

### Crystallography
- **Introduction, crystal planes and directions**
- **Miller indices**
- **Separation between successive (hkl) planes**
- **X-ray diffraction by crystal planes**
- **Bragg’s law**
- **Laue method**
- **Powder method**

### Problems
- **Total periods required:** 16

### UNIT-III: PRINCIPLES OF QUANTUM MECHANICAS AND BAND THEORY OF SOLIDS

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<tbody>
<tr>
<td>34.</td>
<td><strong>Principles of Quantum Mechanics:</strong></td>
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<td></td>
<td>Black body radiation</td>
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<tr>
<td>35.</td>
<td>Wien’s law, Rayleigh-Jeans law and Planck’s law (qualitative)</td>
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<td>36.</td>
<td>Waves and particles</td>
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<td>37.</td>
<td>Matter waves, de-Broglie’s hypothesis</td>
<td>T1</td>
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<td>38.</td>
<td>G.P. Thomson experiment</td>
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<td>39.</td>
<td>Heisenberg’s uncertainty principle</td>
<td>T2</td>
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<td>40.</td>
<td>Schrödinger’s one dimensional wave equation (time independent)</td>
<td>T2</td>
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<tr>
<td>41.</td>
<td>Significance of wave function</td>
<td>T2</td>
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<td>42.</td>
<td>Particle in a one dimensional potential box</td>
<td>T2</td>
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<td>43.</td>
<td>Fermi-Dirac distribution and effect of temperature (qualitative treatment)</td>
<td>T1</td>
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<td>44.</td>
<td>Scattering-source of electrical resistance</td>
<td>T2</td>
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<tr>
<td>45.</td>
<td><strong>Band Theory of Solids:</strong> Electron in a periodic potential</td>
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<td>46.</td>
<td>Kronig-Penney model (qualitative treatment)</td>
<td>T2</td>
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<td>47.</td>
<td>Origin of energy band formation in solids, effective mass of electron</td>
<td>T1</td>
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<td>48.</td>
<td>Distinction between metals, semiconductors and insulators based on band theory</td>
<td>T1</td>
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<tr>
<td>49.</td>
<td>Problems</td>
<td>T1</td>
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</table>

**Total periods required:** 17
# UNIT-IV: DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS

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<table>
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<tr>
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</table>
| 50. | **Dielectric Properties of Materials:**  
Introduction, dielectric constant | 1 | T1 |
| 51. | Electronic polarization | 1 | T1 |
| 52. | Ionic and orientation polarizations  
(qualitative treatment) | 1 | T1 |
| 53. | Local field | 1 | T1 |
| 54. | Clausius - Mossotti equation, frequency  
dependence of polarisability (qualitative treatment) | 1 | T1 |
| 55. | Ferro and Piezo electricity | 2 | T1 |
| 56. | **Semiconductors:**  
Introduction,  
Intrinsic semiconductors-carrier concentration | 1 | T2 |
| 57. | Extrinsic semiconductors- carrier concentration | 1 | T1 |
| 58. | Electrical conductivity in semiconductors | 1 |
| 59. | Drift and diffusion, Einstein’s relation | 1 | T2 |
| 60. | Hall effect | 1 | T2 |
| 61. | Direct and indirect band gap semiconductors | 1 | T2 |
| 62. | p-n junction, energy diagram of p-n diode  
diode equation (qualitative) | 1 | T1 |
| 63. | LED | 1 | T1 |
| 64. | Photo diode and solar cell | 1 | T1,T2 |
| 65. | Problems | 1 | T1 |
|   | **Total periods required:** | 17 |

# UNIT-V: MAGNETIC PROPERTIES OF MATERIALS, SUPERCONDUCTIVITY AND NANOMATERIALS

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<table>
<thead>
<tr>
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</table>
| 66. | **Magnetic Properties of Materials:**  
Introduction, origin of magnetic moment | 2 | T2 |
| 67. | Classification of magnetic materials into dia,  
para, ferro, anti-ferro and ferri magnetism | 1 | T2 |
| 68. | Hysteresis | 1 | T2 |
| 69. | Soft and hard magnetic materials | 1 | T2 |
| 70. | **Superconductivity:** General properties | 1 | T2 |
| 71. | Meissner effect | 1 | T2 |
| 72. | Penetration depth, Type-I and Type-II  
superconductors | 1 | T2 |
| 73. | Flux quantization, Josephson effects | 1 | T2 |
| 74. | Applications of superconductors | 1 | T1 |
| 75. | **Nanomaterials:** Introduction, surface area to  
volume ratio, quantum confinement | 1 | T2 |
<p>| 76. | Properties of nanomaterials | 1 | T2 |</p>
<table>
<thead>
<tr>
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<th>Periods</th>
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<tbody>
<tr>
<td>77.</td>
<td>Synthesis of nanomaterials by ball milling, plasma arcing</td>
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<td>Pulsed laser deposition and sol-gel method</td>
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<td>Carbon nanotubes—properties and applications</td>
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<td>80.</td>
<td>Applications of nanomaterials</td>
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<td>T2</td>
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<tr>
<td>81.</td>
<td>Problems</td>
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<td>T1</td>
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</tbody>
</table>

**Total periods required:** 17

**Grand total periods required:** 85

**TEXTBOOKS:**


**REFERENCE BOOKS:**


**Signature of the faculty Member**

**Signature of the HOD**