

## LESSON PLAN

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

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

**Name of the faculty Member:**

S. No.	Topic	No. of periods	Book(s) followed	Topics for self study
<b>UNIT-I: LASERS, FIBER OPTICS AND HOLOGRAPHY</b>				
1.	<b>Lasers:</b> Introduction, characteristics of laser	1	T1	
2.	Principles of lasing action	1	T1	
3.	Spontaneous and stimulated emission of radiation	1	T1	
4.	Einstein's coefficients	1	T1	
5.	Population inversion	1	T1	
6.	Ruby laser	1	T1	
7.	Helium-Neon laser	1	T1	
8.	Semiconductor laser	1	T1	
9.	Applications of lasers	1	T1	
10.	<b>Fiber optics:</b> Introduction, Construction and working principle of optical fiber	1	T1	
11.	Acceptance angle, acceptance cone and numerical aperture	1	T1	
12.	Types of optical fibers and refractive index profiles	1	T1	
13.	Attenuation and losses in fibers	1	T1	
14.	Optical fiber communication system	1	T1	
15.	Applications of optical fibers in sensors and medicine	1	T1	
16.	<b>Holography:</b> Introduction, construction of a hologram	1	T1	
17.	Reconstruction of image from hologram, applications	1	T1	
18.	Problems	1	T1	
<b>Total periods required:</b>		<b>18</b>		
<b>UNIT-II: SPECIAL THEORY OF RELATIVITY, ACOUSTICS OF BUILDINGS AND CRYSTALLOGRAPHY</b>				
19.	<b>Special Theory of Relativity:</b> Introduction, absolute frame of reference	1	T1	
20.	Time dilation, length contraction	1	T1	
21.	Addition of velocities	1	T1	
22.	Mass-energy equivalence, energy-momentum relation	1	T1	

23.	<b>Acoustics of Buildings:</b> Introduction, Basic requirement of acoustically good hall	1	T1
24.	Reverberation and time of reverberation, Sabine's formula for reverberation time (qualitative treatment)	1	T1
25.	Absorption coefficient of Sound and its measurement, factors affecting the architectural acoustics and their remedies.	1	T1
26.	<b>Crystallography:</b> Introduction, crystal planes and directions	1	T1
27.	Miller indices	1	T1
28.	Separation between successive (hkl) planes	1	T1
29.	X-ray diffraction by crystal planes	1	T1
30.	Bragg's law	1	
31.	Laue method	1	T1
32.	Powder method	1	T1
33.	Problems	2	T1
<b>Total periods required:</b>		<b>16</b>	
<b>UNIT-III: PRINCIPLES OF QUANTUM MECHANICS AND BAND THEORY OF SOLIDS</b>			
34.	<b>Principles of Quantum Mechanics:</b> Black body radiation	1	T1
35.	Wien's law, Rayleigh-Jeans law and Planck's law (qualitative)	1	T1
36.	Waves and particles	1	T1
37.	Matter waves, de-Broglie's hypothesis	1	T1
38.	G.P. Thomson experiment	1	T1
39.	Heisenberg's uncertainty principle	1	T2
40.	Schrödinger's one dimensional wave equation (time independent)	1	T2
41.	Significance of wave function	1	T2
42.	Particle in a one dimensional potential box	1	T2
43.	Fermi-Dirac distribution and effect of temperature (qualitative treatment)	1	T1
44.	Scattering-source of electrical resistance	1	T2
45.	<b>Band Theory of Solids:</b> Electron in a periodic potential	1	T2
46.	Kronig-Penney model (qualitative treatment)	2	T1
47.	Origin of energy band formation in solids, effective mass of electron	1	T1
48.	Distinction between metals, semiconductors and insulators based on band theory	1	T1
49.	Problems	1	T1
<b>Total periods required:</b>		<b>17</b>	

**UNIT-IV:DIELECTRIC PROPERTIES OF MATERIALS AND SEMICONDUCTORS**

50.	<b>Dielectric Properties of Materials:</b> 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.	<b>Semiconductors:</b> 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**

66.	<b>Magnetic Properties of Materials:</b> 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.	<b>Superconductivity:</b> 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.	<b>Nanomaterials:</b> Introduction, surface area to volume ratio, quantum confinement	1	T2
76.	Properties of nanomaterials	1	T2

77.	Synthesis of nanomaterials by ball milling, plasma arcing	1	T2	
78.	Pulsed laser deposition and sol-gel method	1	T1	
79.	Carbon nanotubes-properties and applications	1	T1	
80.	Applications of nanomaterials	1	T2	
81.	Problems	1	T1	
<b>Total periods required:</b>		<b>17</b>		
<b>Grand total periods required:</b>		<b>85</b>		

**TEXTBOOKS :**

T1: S. Mani Naidu, **Engineering Physics**, Pearson Education, 2013.

T2: P. K. Palaniswamy, **Engineering Physics**, Scitech Publications India Private Limited, 2009

**REFERENCE BOOKS:**

R1: R. K. Gaur and S. L. Gupta , **Engineering Physics** , Dhanpat Rai Publications (P) Ltd., 8<sup>th</sup> Edition, 2001.

R2 : M. R. Srinivasan, **Engineering Physics** , New Age International (P) Limited, Publishers, 1<sup>st</sup> Edition, 2010.

**Signature of the faculty Member**

**Signature of the HOD**