



**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BANGALORE -  
560109**

**DEPARTMENT OF SCIENCE AND HUMANITIES**

NAME OF THE STAFF : PAVITHRA J  
 COURSE CODE/TITLE : 18PHY12/ENGINEERING PHYSICS  
 SEMESTER/YEAR/SECTION : I / I / D  
 ACADEMIC YEAR : 2019-2020

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date	Delivered Date
<b>MODULE 1</b>							
1	Definition of SHM and derivation of differential equation of motion for SHM	L+D, I	BB	1	1	19/08/19	19/8/19
2	Tutorial	L+D,PS	BB	0	1	20/08/19	20/8/19
3	Mass suspended to spring, Derivation of expressions for force constants for series and parallel combination of springs.	L+D, DE, PS	BB, Model, LV	1	2	21/08/19	21/8/19
4	Complex notation of simple harmonic motion ( $Ae^{i(\omega t + \phi)}$ ), Phasor representation of simple harmonic motion. Definition of free oscillations with examples, mention the equation of motion, Natural frequency of vibration.	L+D, DE, PS	BB, Model	1	3	22/08/19	22/8/19
5	Damped oscillations: Definition with examples, Derivation of decaying amplitude	L+I, PS	BB	1	4	23/08/19	23/8/19
6	Discussion of 3 cases viz, over damping, critical damping and underdamping. Quality factor: Definition, equation and its significance,	L+D, PS	BB	1	5	26/08/19	23/8/19
7	Tutorial	L+D,PS	BB	0	5	27/08/19	27/8/19
8	Forced oscillations: Definition, derivation of expressions for amplitude and phase of forced vibrations. Discussion of 3 cases (i) $p \ll \omega$ , (ii) $p = \omega$ and (iii) $p \gg \omega$	L+I, D, PS	BB	1	6	28/08/19	28/8/19
9	Resonance: Definition, Examples, Condition for resonance and mention expression for maximum amplitude. Sharpness of Resonance: Definition and significance, mention the effect of damping on sharpness of resonance, Helmholtz Resonator-Description and mention the expression for resonant frequency.	L+I	BB	1	7	29/08/19	29/8/19
10	Shock waves: Definition of Mach number, classification of objects based on Mach number (subsonic, supersonic, Transonic and hypersonic). Definition and properties of shock waves.	L+D, I, DE, PS	BB	1	8	30/08/19	30/8/19
11	Definition of control volume, Laws of conservation of mass, energy and momentum	L+D	BB	1	9	31/08/19	4/9/19
12	Tutorial	L+D,PS	BB	0	9	03/09/19	3/9/19
13	Construction and working of Reddy shock tube, Applications of shock waves.	L+I	BB+LCD	1	10	04/09/19	5/9/19

**MODULE 2**

14	Introduction to need Quantum mechanics, Wave nature of particles: De-Broglie hypothesis followed by wavelength equations, extended to accelerated electron	L+D, I, PS	BB	1	11	05/09/19	6/9/19
15	Heisenberg's uncertainty principle and its application, (Non-existence of electron inside the nucleus)	L+D, PS	BB	1	12	06/09/19	9/9/19
16	Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function,	L+I	BB	1	13	09/09/19	11/9/19
17	Setting up of one dimensional time independent Schrodinger wave equation.	L+I	BB	1	14	14/09/19	12/9/19
18	Eigen values and Eigen functions. Application of Schrodinger wave equation for a particle in a potential well of infinite depth and for free particle	L+I, PS	BB	1	15	16/09/19	12/9/19
19	Tutorial	L+D,PS	BB	0	15	17/09/19	17/9/19
20	Explanation of the process of induced absorption, Spontaneous and Stimulated emission, Einstein's coefficients (expression for energy density).	L+D, I, PS	BB	1	16	18/09/19	14/9/19
21	Requisites of a Laser system, Condition for laser action.	L+D, I, PS	BB	1	17	19/09/19	16/9/19
22	Mention different modes of vibrations of CO <sub>2</sub> , Construction and working of CO <sub>2</sub> laser	L+I	BB+LCD	1	18	20/07/19	23/9/19
23	Construction and working of semiconductor Laser,	L+D, I, PS	BB+LCD	1	19	23/09/19	23/9/19
24	Tutorial	L+D,PS	BB	0	19	24/09/19	25/9/19
25	Application of Lasers in Defense (Laser range finder), Application of Lasers in Engineering (Data storage)	L+D, I, CL(S)	BB+LCD	1	20	25/09/19	25/9/19

**MODULE 3**

26	Review of classical free electron theory, Failure of classical free electron theory, Quantum free electron theory, Assumptions.	L+D, I	BB	1	21	26/09/19	26/9/19
27	Fermi factor at different temperature, density of states (qualitative only) Fermi-Dirac Statistics, Mention the expression for electrical conductivity based on quantum free electron theory.	L+I, PS	BB	1	22	27/09/19	27/9/19
28	Derivation of the expression for Fermi energy at zero Kelvin, Merits of quantum free electron theory.	L+I, PS	BB	1	23	30/09/19	30/9/19
29	Tutorial	L+D,PS	BB	0	23	01/10/19	1/10/19
30	Fundamentals of semiconductor. Description of Fermi level in intrinsic semiconductor. Mention the expression for electron and hole concentration in intrinsic semiconductors.	L+D, I	BB+LCD	1	24	03/10/19	3/10/19
31	Derivation of relation between Fermi energy and energy gap for an intrinsic semiconductor.	L+I, PS	BB	1	25	04/10/19	4/10/19
32	Derivation of the expression for electrical conductivity of semiconductors	L+I, PS	BB	1	26	05/10/19	9/10/19
33	Explanation of Hall effect with Hall voltage and Hall field, Derivation of the expression for Hall coefficient.	L+I, PS	BB	1	27	09/10/19	11/10/19
34	Fundamentals of dielectrics. Polarization, mention the relation between dielectric constant and polarization. Types of polarization. Polar and non-polar dielectrics	L+D, I	BB	1	28	10/10/19	14/10/19

35	Definition of internal field in case of solids and mention its expression for one dimensional case and three dimensional cases and Lorentz field. Derivation of Clausius-Mossotti equation.	L+I, PS	BB	1	29	11/10/19	16/10/19
36	Description of solid, liquid and gaseous dielectrics. Applications of dielectrics in transformers.	L+D, I	BB+LCD	1	30	12/10/19	17/10/19

#### MODULE 4

37	Elasticity: Explain the concept of elasticity, plasticity, stress and strain. Discuss two types of stresses namely tensile stress and compressive stress.	L+D, DE, I	BB+LCD	1	31	17/10/19	18/10/19
38	Explain Hookes' law, stress strain curve, strain hardening and softening. Briefly discuss the effect of stress, temperature, annealing, impurities on elasticity	L+I	BB+LCD	1	32	18/10/19	21/10/19
39	Explain three different elastic moduli. Poisson's ratio: Define lateral strain and linear strain and hence Poisson's ratio	L+I, PS	BB+LCD	1	33	21/10/19	30/10/19
40	Tutorial	L+D,PS	BB	0	33	22/10/19	22/10/19
41	Relation between shear strain, longitudinal and compression strain: Show that longitudinal strain + compression strain = shear strain by considering a cubical elastic body.	L+I, PS	BB	1	34	23/10/19	31/10/19
42	Derive the relation between $Y$ , $\sigma$ and $\eta$	L+I, PS	BB	1	35	24/10/19	4/11/19
43	Derive the relation between $K$ , $Y$ and $\sigma$ .	L+I, PS	BB	1	36	25/10/19	5/11/19
44	Tutorial	L+D,PS	BB	0	36	26/10/19	5/11/19
45	Derive the relation between $K$ , $\eta$ and $Y$ . Discuss the limiting values of $\sigma$ and limitations of Poisson's ratio.	L+I, PS	BB	1	37	28/10/19	11/11/19
46	Bending of beams: Definition of beams, different types of beams, neutral surface/plane and neutral axis. Define bending moment. Derive the expression for bending moment in terms of moment of inertia.	L+I, DE, PS	BB	1	38	30/10/19	12/11/19
47	Mention the expression for bending moment for circular and rectangular cross sections. Describe a single cantilever and hence derive the expression for $Y$ .	L+I, DE, PS	BB, Model, LV	1	39	31/10/19	16/11/19
48	Twisting couple on cylindrical wire, explain torsional oscillations, derive the expression for couple per unit twist for solid cylinder. Mention the expression for Time period of torsional oscillations	L+I, DE, PS	BB, Model, LV	1	40	04/11/19	16/11/19
49	Tutorial	L+D,PS	BB	0	40	05/11/19	19/11/19

#### MODULE 5


50	Description of propagation mechanism of light through an optical fiber.	L+D, I	BB+LCD, LV	1	41	06/11/19	19/11/19
51	Angle of acceptance and numerical aperture (NA): Theory with condition for propagation. Modes of propagation and V number and types of optical fibers(qualitative)	L+D, I, PS	BB+LCD, LV	1	42	07/11/19	20/11/19
52	Attenuation: Definition of attenuation, name the three types of attenuation, Causes of attenuation: Explain absorption, scattering and radiation losses. Mention the expression for attenuation coefficient	L+ I, CL(S), PS	BB+LCD	1	43	08/11/19	22/11/19
53	Tutorial	L+D,PS	BB	0	43	09/11/19	23/11/19
54	Application of optical fiber: Point to point communication: Explain with the help of block diagram. Merits and de merits of optical fiber communication.	L+ I, CL(S), PS	BB+LCD	1	44	11/11/19	25/11/19

55	Tutorial	L+D,PS	BB	0	44	12/11/19	26/11/19
56	Briefly explain scalar, product, vector product, del operation, concept of divergence, gradient and curl along with physical significance	L+I, PS	BB	1	45	13/11/19	27/11/19
57	Derivation of Gauss divergence theorem and mention Stokes' theorem. Explain briefly Gauss flux theorem in electrostatics and magnetism	L+I	BB	1	46	14/11/19	28/11/19
58	Explain Ampere's law, Biot-Savart's law and Faraday's laws of electromagnetic induction,	L+I	BB	1	47	18/11/19	29/11/19
59	Tutorial	L+D,PS	BB	0	47	19/11/19	29/11/19
60	Discuss continuity equation, displacement current.	L+I, PS	BB	1	48	20/11/19	31/12/19
61	Derive the expression for displacement current, Maxwell-Ampere's law. List four Maxwell's equations in differential form. Derive wave equation in terms of electric field using Maxwell's equations.	L+I, PS	BB	1	49	21/11/19	3/12/19
62	Mention of plane electromagnetic waves in vacuum along with the equations for E, B and c. Explain the transverse nature of electromagnetic waves, three types of polarization.	L+I, PS	BB	1	50	22/11/19	4/12/19
63	Revision	L + D	BB	0	50	23/11/19	6/12/19
64	Revision	L + D	BB	0	50	25/11/19	6/12/19
65	Tutorial	L + D	BB	0	50	26/11/19	6/12/19
66	Revision	L + D	BB	0	50	27/11/19	6/12/19
67	Revision	L + D	BB	0	50	28/11/19	6/12/19
68	Revision	L + D	BB	0	50	29/11/19	6/12/19
69	Revision	L + D	BB	0	50	30/11/19	6/12/19
70	Revision	L + D	BB	0	50	02/12/19	6/12/19
71	Tutorial	L + D	BB	0	50	03/12/19	6/12/19
72	Revision	L + D	BB	0	50	04/12/19	6/12/19
73	Revision	L + D	BB	0	50	05/12/19	6/12/19
74	Revision	L + D	BB	0	50	06/12/19	6/12/19
75	Revision	L + D	BB	0	50	12/12/19	6/12/19
76	Revision	L + D	BB	0	50	13/12/19	6/12/19
77	Revision	L + D	BB	0	50	18/12/19	6/12/19
78	Revision	L + D	BB	0	50	19/11/19	6/12/19
79	Revision	L + D	BB	0	50	20/12/19	6/12/19
80	Tutorial	L + D	BB	0	50	21/12/19	6/12/19

Total number of lecture hours = 50

Total number of tutorial hours = 15

Total number of revision hours = 15

  
Course In charge

  
Head - Dept

  
Principal