DEPARTMENT OF PHYSICS

R.V. COLLEGE OF ENGINEERING

(An autonomous institution affiliated to VTU, Belagavi)
Mysore, Bangalore-560059

***Course Title*: Engineering Physics**	***Course Code*: 21PH12/22**
***Total Contact Hours*: 45**	***Credits: 05***
***SEE Marks*: 150**	***CIE Marks*: 150**
Semester: ODD	***Academic Year: 2021-2022***
***Lesson Plan Author*:**	***Date*: 03.01.2022**

Week	Day/ Hour	Unit (Hour)	Main topic	Sub topic	COs
I	1	I(1)	**Elasticity and Oscillations**	Basics of Elasticity: Definitions of stress, strain, moduli of elasticity, poisson's ratio and Hooke's law.	1
	2	I(2)		Definition of Beam, types of beam/cantilever, derivation of bending moment.	2
	3	I(3)		Depression for single cantilever, problem solving.	2,3
	4	I(4)		Derivation of torsion of a cylinder, torsion pendulum; expression for time period and rigidity modulus, problem solving	1,2,3
II	5	I(5)		Introduction to oscillation, types of oscillation, Review of simple harmonic oscillation, example: spring mass system.	1
	6	I(6)		Introduction to damped harmonic oscillation (DHO), setting up of differential equation and solving the differential equation.	1,2
	7	I(7)		Heavy damped, critical damped and underdamped condition for DHO.	2,3

				Problem solving.	
	8	I(8)		Introduction to Forced harmonic oscillation (FHO), setting up of differential equation and solving the differential equation. Three conditions for FHO.	1,2
III	9	I(9)		Application of FHO to electrical oscillation, LCR series circuit, set up and compare with mechanical oscillation. Electrical resonance and problem solving.	1,2,3
Note: Any two or three hours portions will be online.					
	10	II(1)	**Quantum mechanics**	Introduction to Quantum mechanics, black body radiation spectrum, Planck's hypothesis, duel nature of matter.	1
	11	II(2)		Definition of matter waves, deBroglie wavelength of electron, properties of matter wave, group velocity and phase velocity; interrelation in dispersive medium.	1
	12	II(3)		Heisenberg's Uncertainty principle, broadening of spectral line.	1,2
IV	13	II(4)		Problem solving (matter waves and uncertainty principle).	1,2,3
	14	II(5)		Setting up of one dimension time independent Schrodinger's wave equation.	1,2
	15	II(6)		Physical significance of wave function, properties of wave function, Eigen function and Eigen values.	1,2
	16	II(7)		Particle in a one dimensional potential well, normalization of wave function and energy eigen values.	1,2
V	17	II(8)		Free particle concept, problem solving.	1,2,3
	18	II (9)		Problem solving (particle in a box)	
Note: Any two or three hours portions will be online.					

	19	III(1)	**Electrical Conductivity in solids:**	Introduction to electrical conductivity, postulates of Classical Free Electron Theory(CFET), basic definitions: relaxation time, mean free path, expression for current and electrical conductivity, limitations of CFET.	1
	20	III(2)		Postulates of Quantum free electron theory (QFET), definition of density of state, Fermi energy, Fermi factor, variation of Fermi factor with temperature	1
VI	21	III(3)		Success of QFET (mention), Derivation of carrier concentration in metal at 0K.	1,2
	22	III(4)		Introduction to band theory of solids: concept of intrinsic and extrinsic semiconductor, derivation of expression for electron concentration in conduction band of an intrinsic semiconductor. Expression for hole concentration.	1,2
	23	III(5)		Derivation of Fermi level in intrinsic semiconductor, derivation of intrinsic carrier density (n).	1,2
	24	III(6)		Extrinsic semiconductor, energy band diagram of ‘n’ and ‘p’ typeat 0K, variation of carrier concentration with temperate, variation of Fermi level with temperature, variation of Fermi level with increasing carrier concentration.	1,2
VII	25	III(7)		Hall effect in semiconductor, derivation of expression for hall coefficient. Problem solving.	1,2,3
	26	III(8)		Introduction to dielectrics, definition of polarization, polarization mechanism	1,2
	27	III(9)		Definition of internal field in solids, Derivation of Classius Mossotti equation, Problem solving.	1,2,3
Note: Any two or three hours portions will be online.					

	28	IV(1)	**Lasers and Optical fibers:**	Introduction to laser, interaction of radiation with matter, rate of emission and absorption.	1
VIII	29	IV(2)		Expression for energy density interms of Einstein's coefficients. Condition for amplification.	1,2
	30	IV(3)		Requisites of laser action, meta stable state, types of pumping, Role of Optical resonator.	1,2
	31	IV(4)		CO2 laser: principle, construction and working and applications	1,2
	32	IV(5)		Laser in eye and skin surgery, Numerical problems.	1,2,3
IX	33	IV(6)		Introduction to optical fiber, acceptance cone and expression for Numerical aperture	1,2
	34	IV(7)		V number and Modes of propagation, problem solving. Attenuation in fiber.	1,2,3
	35	IV(8)		Types of attenuation, point to point communication. Advantages of p to p communication.	1,2,3,
	36	IV(9)		Sensors: Temperature sensor: Intensity modulator and phase modulators, problem solving.	
Note: Any two or three hours portions will be online.					
X	37	V(1)	Electron Ballistics & Surface Characterization Techniques	Introduction to electron ballistics: pictorial representation of electric field. Motion of an electron in a uniform electric field, electric field perpendicular to initial velocity (derivation),	1,2
	38	V(2)		Fleming's left hand rule, Electrostatic deflection, electron projected at an angle into an uniform electric field, problem solving.	1,2,3

	39	V(3)		Motion of an electron in a uniform magnetic field, parallel and perpendicular to initial velocity. Magnetic field acting at an angle to initial velocity.	1,2
	40	V(4)		Magneto static deflection, Lorentz equation (no derivation). Crossed electric and magnetic field configuration.	1,2
XI	41	V(5)		Velocity selector: parallel electric and magnetic field configuration. Problem solving.	1,2,3
	42	V(6)		Electron lens and Magnetic lens	1,2
	43	V(7)		Scanning electron microscope (SEM): Principle and working, focussing of electron beam using non uniform magnetic field. Interaction of electron beam with sample in SEM, limitation of SEM	1,2,3
	44	V(8)		Scanning Tunnelling microscope: principle and working.	1,2,3
XII	45			Problem solving.	3
Note: Any two or three hours portions will be online.					