

VIVEKANANDA DEGREE COLLEGE
Rajajinagar, II Stage, Bangalore 560055

LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: Mechanics & Properties of Matter

Semester: I sem

Class: I B.Sc.

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:		Name of the Faculty: Prof. Dr. Vasu			
1	Newton's laws and their applications Statement and explanation of the Newton's laws of motion, Inertial frames of reference, Galilean transformations, Atwood machine, Static and dynamic friction, Motion along inclined plane with and without frictional force, Use of free body diagrams, motion in a resistive medium, terminal velocity.	8 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/10/20 To 14/01/20	VS
2	Non-inertial frames of reference, Rotating coordinate system, pseudo forces, Centrifugal and Coriolis forces, effects of Centrifugal and Coriolis forces at earth's surface, the Foucault pendulum (qualitative)	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/01/21 20/2/21	VS
		Total hours:13			
Unit 2 :		Name of the Faculty: Prof. prof. Chandini C S			
3	Work energy and conservation laws Work done by a constant and a variable force, power, kinetic energy, conservative and non-conservative forces, potential energy, law of energy conservation, momentum, pulse, collisions, elastic and inelastic collisions, conservation of momentum, ballistic pendulum, rocket motion.	8 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/10/20 To 14/01/20	CSR+ DSP
4	Motion due to gravitation Newton's law of gravitation, inertial and gravitational mass, gravitational potential energy, weight of a body,	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/01/21 20/2/21	DSP

	Satellite motion, artificial satellites, escape velocity, circular orbits, planetary motion, Kepler's laws. Motion of rigid bodies Unit - 3				
		Total hours:13			
	Internal Assessment Test/Quiz/Assignment – 01				
	Unit 3:		Name of the Faculty: 0Prof. Badrinath		
5	Motion of rigid bodies Angular velocity, angular momentum and acceleration, kinetic energy in rotational motion, moment of Inertia of a body; calculation of moment of inertia of a disk, annular ring, solid sphere and rectangular bar; parallel and perpendicular axis theorems, torque and dynamics rotational motion, conservation of angular momentum with illustrations.	8 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/10/20 To 14/01/20	CGB
6	Periodic motion Amplitude, period, frequency of period of oscillations, Simple harmonic oscillation; amplitude, frequency and energy in SHM, Simple and physical pendulum; damped oscillations; forced oscillations - concept of resonance; coupled oscillators.	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/01/21 20/2/21	CGB
		Total hours : 13			
	Unit 4:		Name of the Faculty: Prof. DSP+CGB+VS		
7	Surface tension Molecular interpretation of surface tension; Surface energy; Angle of contact and wetting, pressure difference across a curved surface; Interfacial tension; drop weight method with necessary theory, factors affecting surface tension.	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	15/10/20 To 28/11/20	DSP
8	Elasticity Elasticity and plasticity, Stress and strain, elastic moduli, relationship between elastic constants, Poisson's ratio, work done in stretching a wire, bending of beams, bending moment, theory of single cantilever, couple per unit twist, torsional oscillations.	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/11/20 To 15/01/21	CGB

Viscosity Laminar flow, the coefficient of viscosity, Poiseuille's method of measuring viscosity, temperature dependence of viscosity, Stokes' law. Reference,	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	14/01/21 To 20/02/21	VS
Total hours : 13				

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D. M. *D. S.*
U. S.

D. S.
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HOD of Physics
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Rajajinagar II Stage,
Bangalore - 560 055

D. S.
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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: Thermodynamics and Kinetic Theory of Gases

Semester: II sem

Class: I B.Sc.

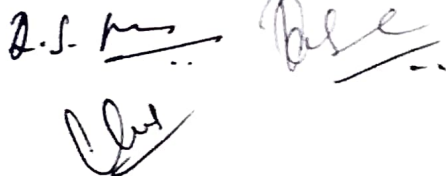
Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:					
Name of the Faculty: Prof. Badrinath+ Prof. Chandini C S					
1	Basic Concepts and the zeroth law of thermodynamics Macroscopic and microscopic descriptions of a system; Thermal Equilibrium - Zeroth Law of Thermodynamics; Concept of temperature; Thermodynamic equilibrium; Thermodynamic coordinates - extensive and intensive; Equations of state; Various processes- PVT indicator diagrams.	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 TO 25/05/21	CGB
2	First Law of Thermodynamics The first law of Thermodynamics; Sign convention for heat and work; Work done in an isothermal process for an ideal gas; Internal energy as a state function; Application of the first law for (i) Cyclic Process (ii) Adiabatic Process (iii) Isochoric Process (iv) Isobaric process and (v) Isothermal Process.	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	26/05/21 To 28/06/21	CSR
3	Second Law of Thermodynamics Reversible and irreversible processes; Carnot Cycle and its efficiency (with derivation); Second law of thermodynamics (Kelvin's & Clausius' statements and their equivalence); Carnot Engine; Practical internal combustion engines - Diesel Cycles (qualitative treatment). Entropy	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/06/21 To 29/07/21	CGB
4	Entropy The concept of entropy; Entropy of an ideal gas; Entropy - reversible process, Entropy - irreversible process; Entropy and the second law; Clausius inequality; Principle of increase	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	30/07/21 to 19/08/21	CGB

	of entropy; Entropy change in adiabatic and isobaric process; Entropy and disorder.				
		Total hours:13			
	Unit 2 :	Name of the Faculty: Prof. Shwetha H			
5	Thermodynamic potentials Internal Energy; Enthalpy; Helmholtz free energy; Gibbs free energy and their significance; Maxwell's thermodynamic relations and their significance; TdS relations; Energy equations and Heat capacity equations; Third law of thermodynamics (Nernst Heat theorem).	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 TO 25/05/21	HS
6	Phase transitions of the first order Melting, vaporization and sublimation; Condition of equilibrium of phases in terms of Gibbs potential; Clausius-Clapeyron equation - elevation of boiling point, depression of freezing point; Equilibrium between phases - triple point.	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	26/05/21 To 28/06/21	HS
7	Conduction and convection Heat transfer, thermal conduction, coefficient of thermal conductivity, conduction along a bar, Forbes method for thermal conductivity, conductivity of liquids, conductivity of gases, natural and forced convection, Reynold's number.	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/06/21 to 19/08/21	HS
		Total hours:13			
	Internal Assessment Test/Quiz/Assignment – 01				
	Unit 3:	Name of the Faculty: Dr. Vasu			
8	Low Temperature Physics Methods of producing low temperatures: (i) Joule Thomson (Joule Kelvin / Throttling / Porous plug) experiment, Joule Thomson Coefficient, inversion temperature (ii) Adiabatic demagnetization - working and theory.	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 TO 25/05/21	VS
9	Liquefaction of gases Cascade process; Regenerative cooling coupled with Joule Thomson cooling; Adiabatic expansion with Joule	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	26/05/21 To 28/06/21	VS

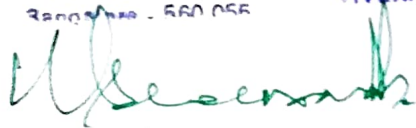
	Thomson cooling (qualitative).				
10	Black body radiation Kirchoff's law, perfect black body, Stefan-Boltzmann law, spectral energy distribution, Wien's displacement law, Rayleigh-Jeans law, Planck's distribution (derivation), radiation pyrometry, temperature of the sun, the solar constant.	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/06/21 to 19/08/21	VS
Total hours :		13			
Unit 4:			Name of the Faculty: Prof. D S Poornima		
11	Kinetic Theory of Gases Basic assumptions of the kinetic theory; Derivation of $pV = \frac{1}{3}mnc^2$ deduction of perfect gas equation; Maxwell's law of distribution of velocity (without derivation); Calculation of most probable velocity, mean velocity and root mean square velocity; Derivation of expression for mean free path; Degrees of freedom and principle of equipartition of energy; Derivation of $U = \frac{3}{2} RT$ Specific heats of an ideal gas, atomicity of gases Transport Phenomena	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 TO 25/05/21	DSP
12	Transport Phenomena (7 hours) Viscosity and thermal conduction in gases (with derivation); Relation between coefficient of viscosity and coefficient of thermal conductivity of a gas	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	26/05/21 To 28/06/21	DSP
13	Real Gases Derivation of van der Waal's equation of state; Andrews experiments on Carbon dioxide; Derivation of the critical constants; Comparison of van der Waal's isotherms with Andrew's isotherms	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/06/21 to 19/08/21	DSP
Total hours :		13			

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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.
Course/Paper Name: Electricity and Magnetism
Semester: III sem
Class: II B.Sc

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:		Name of the Faculty: Dr. Vasu			
1	DC CIRCUIT ANALYSIS : Concept of Voltage and Current Sources, Kirchoff's Current Law, Kirchoff's Voltage Law (statements). Principle of Duality (voltage and current source equivalents). Thevenin's Theorem (statement and proof), Superposition Theorem (statement and proof), Norton's Theorem (Statement and explanation). Reciprocity Theorem. Maximum Power Transfer Theorem (statement and proof).	8 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 30/12/20	VS
2	Transient currents : Self-inductance – definition, explanation, expression $L = \mu N^2 A l$; Magnetic field energy stored in an inductor; Growth and decay of charge in series RC circuit, Growth and decay of current in series LR circuit, Decay of charge in series LCR circuit - Damped, under-damped and overdamped conditions	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	01/01/21 TO 20/02/21	VS
		Total hours:13			
Unit 2 :		Name of the Faculty: Prof. Chandini			
3	Magnetic Field and Forces : Force on a moving charge in a magnetic field, Lorentz force and definition of B, force on a current carrying conductor in uniform magnetic field, Force between parallel conductors; Definition of ampere; Biot – Savart's	13 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	01/09/20 To 20/02/21	CSR

	law, Magnetic field due to a straight current carrying conductor (Derivation for Finite/Infinite Length, Amperes swimming rule, Right hand palm rule), Magnetic field of a circular loop; Force and torque on a circular current loop in a magnetic field, magnetic dipole moment, Field on the axis of a solenoid (derivation and explanation), Principle and theory of a moving coil BG, Concept of dead beat galvanometer, determination of high resistance by leakage, theory of HTG, Ampere's Circuital law (statement), Application of Ampere's law to straight wire, solenoid and toroid				
		Total hours:13			
	Internal Assessment Test/Quiz/Assignment – 01				
	Unit 3:				
			Name of the Faculty: Prof. Badrinath		
4	Scalar and vector fields: Gradient of a scalar function (use of del operator), Divergence and Curl product rules (explanation with geometrical representation), Line, surface and volume integrals (explanation with examples), Fundamental theorem for divergence and curl (statements only).	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	01/09/20 To 15/10/20	BCC
5	ELECTROMAGNETIC WAVES : Equation of Continuity, Displacement Current, Maxwell's equations in differential form (Derivation and physical significance), Derivation of wave equation (for one dimension), Velocity of em waves in free space and isotropic dielectric medium(derivation), Relation between refractive index and permittivity (qualitatively), Transverse nature of Plane em waves, , Poynting Vector, Energy density in electromagnetic field, Momentum and Pressure of em waves (derivation), Electromagnetic waves in a conducting medium – skin effect and skin depth	10 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	16/10/20 To 20/02/21	BCH

Unit 4:		Total hours :	Name of the Faculty: Prof. D S Purnima		
6	ALTERNATING CURRENT : rms and average value of ac – definition and expressions, Representation of sinusoids by complex numbers (brief explanation), response of LR, CR and LCR series circuit to sinusoidal voltage – j operator method, series and parallel resonant (LR parallel C) circuits (mention condition for resonance with expressions for impedance and current), expression for Q factor, band width, AC bridge - Maxwell bridge (derivation of condition for balance , determination of self-inductance of a coil).	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	12/10/2021 TO 12/11/2021	DSP
7	THERMOELECTRICITY : Seebeck effect (brief explanation, experiment and temperature dependence), Thermoelectric series, Neutral temperature, Laws of thermoelectricity (qualitative), Peltier effect, Peltier coefficient (qualitative analysis), Thomson effect, Thomson coefficient (qualitative analysis), Theory of thermoelectric circuits using thermodynamics (Application of thermodynamics to a thermocouple and connected relations with derivation), Thermoelectric diagrams and uses (in finding the Seebeck Coefficients, Peltier coefficient, Thomson coefficient, total emf of a thermocouple, neutral temperature) Applications of thermoelectricity - Boys' Radiomicrometer, thermopile and thermoelectric pyrometer (brief explanation with experimental setup).	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies	15/11/2021 TO 20/02/2021	DSP
		Total hours :	13		

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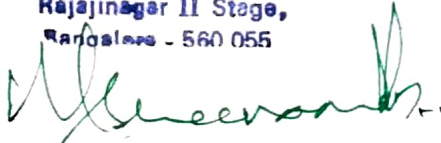






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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: OPTICS and FOURIER SERIES

Semester: IV sem

Class: II B.Sc.

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:		Name of the Faculty: Dr. Vasu			
1	WAVE OPTICS: Huygen's wave theory of light; Huygen's principle, construction Huygen's wave front, Laws of reflection and refraction using spherical wave for at a plane surface (derivation of image distance = object distance using Huygen's construction, derivation of Snell's law).	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	03/05/21 To 28/05/21	VS
2	INTERFERENCE : Coherent sources and their production; Conditions for observing interference (mention); Conditions for constructive and destructive interference (mention)	1 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	29/05/21 To 15/06/21	VS
3	Coherent sources by division of wave front Biprism-theory and working, experiment to determine wavelength; Effect of thin film in the path of one of the beams; Calculation of thickness of the	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	16/06/21 To 15/07/21	VS
4	Coherent sources by division of amplitude: Interference at thin films - reflected and transmitted light, Colours of thin films; Theory of air wedge; Theory of Newton's rings (Only reflected System). Determination of Refractive index of a liquid	4 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar	16/07/21 To 19/08/21	VS
		Total hours:13			

Unit 2 :		Name of the Faculty: Prof. Purnima D S			
5	Diffraction - Fresnel diffraction Concept of Fresnel's half period zones; Theory of rectilinear propagation; Fresnel diffraction, Construction and working of Zone plate; Comparison of Zone plate with lens; Cylindrical Wave front (Half period strips – qualitative), Theory of diffraction at a straightedge	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	03/05/21 To 16/06/21	DSP
6	Fraunhofer diffraction Theory of single slit diffraction; Theory of grating - normal and oblique incidence - Experimental determination of wavelength; Discussion of Dispersive power; Resolving power, Rayleigh's criterion; Expression for resolving power of grating and telescope; Comparison of prism and grating spectra	6 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar	17/06/21 To 19/08/21	DSP
		Total hours:13			
	Internal Assessment Test/Quiz/Assignment – 01				
Unit 3:		Name of the Faculty: Prof. Badrinath			
7	Polarization Review of plane polarized light and method of production; Double refraction at crystals; Huygens' explanation of double refraction; Theory of retarding plates - Quarter wave plates and Half wave plates; Theory of superposition of two plane polarized waves with perpendicular vibrations, Production and detection of linearly , elliptically and circularly polarized light; Optical activity - Fresnel's explanation, Laurent's half shade polarimeter.	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	03/05/21 To 16/06/21	CGB
8	Lasers Introduction; Spontaneous and stimulated emission; Einstein's coefficients and optical amplification; Population inversion; Main components of a laser; Lasing action; Ruby Laser - construction and working - energy level diagram; He-Ne Laser - construction and working - energy level diagram; Spatial	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	17/06/21 To 19/08/21	CGB

	Coherence and directionality, estimates of beam intensity, temporal coherence and spectral energy density				
		Total hours : 13			
	Unit 4:		Name of the Faculty: Prof. Shwetha H		
9	Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series {Example : Fourier Series for (i) $f(x) = e^x$ if $-\pi < x < \pi$ (ii) $f(x) = \begin{cases} -1 & -\pi \leq x \leq 0 \\ 1 & 0 \leq x \leq \pi \end{cases}$ (iii) $f(x) = x^2 \in \text{the interval}[-1, +1]$ } Expansion of functions with arbitrary period. (Concept of change of scale; Fourier Series for Periodic Rectangular Wave; Half - Wave rectifier; Trapezoidal wave : $f(x) = \begin{cases} x, & 0 \leq x \leq 1 \\ 1, & 1 \leq x \leq 2 \\ 3 - x, & 2 \leq x \leq 3 \end{cases}$) Application to Square wave, triangular Wave and Saw Tooth Wave (superposition of first three components to be shown graphically)	9 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	03/05/21 To 15/07/21	HS
10	Optical Fibres Optical fiber-principle, description and classification; Why glass fibers? Coherent bundle; Numerical aperture of fiber; Attenuation in optical fibers - limit Multimode optical fibers; Ray dispersion in multi-mode step index fibers;	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar	16/07/21 To 19/08/21	HS
		Total hours : 13			

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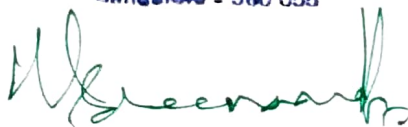


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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: STATISTICAL PHYSICS, QUANTUM MECHANICS – I, ATMOSPHERIC PHYSICS AND NANOMATERIALS

Semester: V sem 501

Class: III B.Sc

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: STATISTICAL PHYSICS		Name of the Faculty:			
1	Specification of state of the system, Macro state, Micro State, Phase Space, Stirling's Approximation, Thermodynamic Probability and its calculation (Description of each with an example); Entropy and Thermodynamic probability ($S = k \ln \Omega$). Basic postulates of Statistical Physics ; Ensemble (Micro – canonical, canonical and grand canonical ensembles)	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 20/09/20	CGB
2	Maxwell – Boltzmann Statistics : Maxwell – Boltzmann Distribution function (Derivation of $n_i = g_i e^{-\alpha - \beta E_i}$, Energy distribution function $f(E_i) = n_i g_i$); Maxwell – Boltzmann law of velocity distribution (mention- most probable velocity, average velocity, rms velocity) Limitations of M – B statistics	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	21/09/20 To 28/10/20	CGB
3	Bose – Einstein Statistics : B-E distribution function (Derivation of $n_i = g_i e^{-\alpha - \beta E_i - 1}$) Bose-Einstein condensation properties of liquid He (qualitative) [Mention of expression of Bose Temperature T_B – Concept BE Condensation –variation of N_0 (number of particles in Zero energy state) and N_e (number of particles in non-Zero energy state) with temperature- BE condensation properties of Liquid He4 (Qualitative description)] Radiation as photon gas, Bose's derivation of Planck's law, Rayleigh-Jeans law, Wein's law ; Specific Heat capacity of metals [Einstein's theory of specific heat	5Hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 12/12/20	CGB

	capacity of solids – [Derivation of the equation where $\theta = hv/k$]				
4	Fermi – Dirac Statistics : Fermi-Dirac distribution function; Fermi sphere and Fermi energy. Fermi gas: Electronic Specific heat Capacity in metals (Mention of the contribution to specific heat capacity from free electrons) Comparison of Maxwell – Boltzmann, Bose – Einstein and Fermi – Dirac distribution functions	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	13/12/20 To 20/02/21	CG
		Total hours:15			
Unit 2 : QUANTUM MECHANICS					
Name of the Faculty:					
5	UNIT II : Failure of Classical Physics to explain the phenomena such as stability of atom, atomic spectra, black body radiation, photoelectric effect, Compton effect and specific heat of solids, Planck's quantum theory, Explanation of the above effects on the basis of quantum mechanics [Experimental observation, failure of classical theory, quantum mechanical explanation, Photoelectric effect - Einstein's explanation, Compton Effect – mention of expression for wavelength shift (no derivation), Specific heat of solids -Einstein's and Debye's explanation of specific heat (qualitative). Stability of atom and atomic spectra, Black body radiation [Mention of Planck's equation, arrive at Wien's and Rayleigh-Jean's equation for energy distribution from Planck's equation].	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 28/10/20	CSR
6	de-Broglie's hypothesis of matter waves (λ in terms of momentum, energy, temperature for monoatomic gas molecules); Thomson's experiment; Davisson and Germer's experiment – normal incidence method; Concept of wave packet, Group velocity and particle velocity (relation between group velocity and particle velocity) Heisenberg's uncertainty principle - different forms; Gamma ray microscope	10 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 20/02/21	CSR

	experiment; Application to Non – existence of electron in nucleus				
		Total hours:15			
Unit 3: ATMOSPHERIC PHYSICS Name of the Faculty:					
7	Fixed gases and variable gases; Temperature structure of the atmosphere; Hydrostatic balance, Variation of pressure with altitude, scale height; Relative and Absolute humidity	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 28/10/20	VS Dr-Vas
8	Beer's law (derivation); Global energy balance for earth – atmosphere system, Greenhouse effect; Atmosphere dynamics – Accelerated rotational frames of reference – Centripetal and Coriolis force (derivation), Gravity and pressure gradient forces (with derivation), Applications of Coriolis force – Formation of trade winds, cyclones, erosion of river banks.	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 12/12/20	Dr-Vas
9	Nanomaterials – Introduction, classification – (0D, 1D, 2D). Quantum dots, nanowires and nanofilms, Multilayered materials- Fullerene, Carbon Nano Tube (CNT), Graphene (Mention of structures and properties); Synthesis techniques (Top down- Explanation of Milling & bottom up - Sol gel process). Characterisation techniques- (brief description of SEM, TEM, AFM). Electron confinement (0D, 1D, 2D- energy levels as a particle in a box); Size effect-Surface to volume ratio; distinction between nanomaterials and bulk materials in terms of energy band. Distinct properties of nano materials (Mention- optical, electrical, mechanical and magnetic properties); BANGALORE UNIVERSITY B.Sc.(CBCS) PHYSICS PHYSICS – UG Page 24 Mention of applications: (Fuel cells, catalysis, phosphors for HD TV, next generation computer chips, elimination of pollutants, sensors)	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	13/12/20 To 20/02/21	Dr-Vas
		Total hours: 15			

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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: ASTROPHYSICS, SOLID STATE PHYSICS AND SEMICONDUCTOR PHYSICS

Semester: V sem 503

Class: III B.Sc

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: ASTROPHYSICS Name of the Faculty:					
1	Parallax and distance: Helio-centric parallax, Definition of parsec (pc), Astronomical unit (AU), light year (ly) and their relations. Luminosity of stars: Apparent brightness, Apparent magnitude - scale of Hipparchus. Absolute magnitude - distance - modulus relationship. Distinction between visual and bolometric magnitudes, Radius of a star.	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 28/10/20	Dr. Vasu
2	Stellar classification: Pickering classification and Yerke's luminosity classification. H-R diagram, Main sequence stars and their general characteristics. Gravitational potential energy or self energy of a star based on the linear density model, Statement and explanation of Virial theorem. Surface or effective temperature and color of a star : Wien's displacement law. Expressions for - average temperature, core temperature, hydrostatic equilibrium, core pressure of a star based on the linear density model of a star. Photon diffusion time (qualitative), Mass - Luminosity relationship and expression for lifetime of a star.	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 12/12/20	Dr. Vasu
3	Evolution of stars: Stages of star formation (GMC - Protostar- T-Tauri) and main sequence evolution, White dwarfs, Pulsars, Neutron stars and Black holes, Variable stars, Supernova explosionits types, Chandrasekhar limit. Event	5Hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	13/12/20 To 20/02/21	Dr. Vasu

	Horizon, Singularity, Schwarzschild radius (qualitative)				
9		Total hours: 15			
Unit 2 : Solid State Physics Name of the Faculty:					
10	Crystal systems and X-rays: Crystal systems-Bravais lattice; Miller indices- Spacing between lattice planes of cubic crystals, Continuous and characteristic X-ray spectra; Moseley's law, Scattering of X-rays - Compton effect, Bragg's law.	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 28/10/20	Prof. Subbarreddy
11	Free electron theory of metals : Electrical conductivity- classical theory (Drude-Lorentz model); Thermal conductivity; Wiedemann - Franz's law; Density of states for free electrons (with derivation); Fermi-Dirac distribution function and Fermi energy; Expression for Fermi energy and Kinetic energy at absolute zero (derivation). Hall Effect in metals	6 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 12/01/21	Prof Subbar Reddy
12	Superconductivity : Introduction – Experimental facts – Zero resistivity – The critical field – The critical current density – Meissner effect, Type I and type II superconductors– BCS Theory (qualitative); Applications - SQUIDS.	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	13/01/21 To 20/02/21	Prof Subbar Reddy
		Total hours: 15			
Internal Assessment Test/Quiz/Assignment – 01					
Unit 3: Semiconductor Physics Name of the Faculty:					
15	Distinction between metals, semiconductors and insulators based on band theory. Intrinsic semiconductors - concept of holes – effective mass - expression for carrier concentration (derivation for both holes and electrons) and electrical conductivity – extrinsic semiconductors – mention of expressions for carrier concentrations and conductivity – impurity states in energy band diagram and the Fermi level. Formation of P-N junction, depletion region, Biased P-N junction, variation of width of the	6 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	01/09/20 To 28/10/20	Prof D-S Prasanna

	depletion region, drift and diffusion current –expression for diode current.				
16	Special Diodes: Zener diode – characteristics and its use as a voltage regulator. Photo diodes, Solar cells and LED (principle, working and applications).	4 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/10/20 To 30/12/20	Prof D.S. Purnan
17	Transistors: Transistor action, Characteristics (CE mode), DC Biasing , Load line analysis (Operating Point, Fixed Bias – Forward bias of Base – Emitter, collector – emitter loop, transistor saturation, Load line analysis ; Voltage divider bias – Transistor saturation, Load line analysis) Transistor as an amplifier(CE mode); . H-parameters	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	31/12/20 To 20/02/21	Prof D.S. Purnan
Total hours :		15			

Signature of Faculty


D.S. Purnan
M. K. A. ...


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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

Semester: VI sem 601

Class: III B.Sc

Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: ATOMIC AND MOLECULAR PHYSICS		Name of the Faculty: Dr. Vasu			
1	Vector Model of the Atom Review of Bohr's theory of hydrogen atom, Sommerfeld's modification of the Bohr atomic model (qualitative). Spatial quantization and spinning electron. Different quantum numbers associated with the vector atom model, Spectral terms and their notations, Selection rules, Coupling schemes(l-s and j-j coupling in multi electron systems), Pauli's Exclusion Principle, Expression for maximum number of electrons in an orbit. Spectra of alkali elements (sodium D-line), Larmor precession, Bohr magneton, Stern-Gerlach Experiment . Zeeman Effect- Experimental study, theory of normal and anomalous Zeeman effect based on quantum theory.	10 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 To 28/07/21	VS <i>Dr. Vasu</i>
2	Molecular Physics: Pure rotational motion, Spectrum and selection rules; Vibrational motion, vibrational spectrum and selection rules; Rotation-Vibration spectrum; Scattering of light-Tyndall scattering, Rayleigh scattering and Raman scattering. Experimental study of Raman effect, Quantum theory of Raman effect - Applications .	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	29/07/21 To 19/08/21	VS <i>Dr. Vasu</i>
		Total hours:15			
Unit 2 : RADIOACTIVE DECAY, DETECTORS AND ACCELERATORS		Name of the Faculty: Prof. D S Purnima			

3	Alpha particle scattering : Rutherford's theory of alpha scattering (assuming the path to be hyperbolic)	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 To 15/06/21	DSP
4	Radioactive Decay : Laws of radioactive decay, half – life, mean life, decay constant; theory of successive disintegration (expression for number of atoms of nth element in the chain – Bateman equations); radioactive equilibrium (secular and transient - cases of long lived parent, short lived parent, daughter and parent of nearly equal half – life).	3 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	16/06/21 To 20/06/21	DSP
5	Alpha decay : Range and energy, Geiger- Nuttal law , Characteristics of alpha spectrum, Gamow's theory of alpha decay [Barrier height, tunneling effect, $\lambda = Pf$ is the frequency of collision of nucleon with the potential barrier; P is the probability of transmission through the barrier); Barrier penetrability factor $(p)e^{-\int_{r_0}^{\infty} \sqrt{2\mu} h^2 \int \sqrt{V(r)-E} dr}$ (no derivation)] Derivation of Q-value-of alpha decay; Exact energy of alpha particle emitted	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	21/06/21 To 10/07/21	DSP
6	Beta decay : Types of beta decay (electron, positron decay and electron capture) Characteristics of beta spectrum and Pauli's neutrino hypothesis	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	11/07/21 To 20/07/21	DSP
7	Detectors : Variation of ionization current with applied voltage in a gas counter, Proportional counter, GM Counter (Construction, working, characteristics, efficiency and quenching)	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	21/07/21 To 10/08/21	DSP
8	Particle accelerators : Linear accelerator, Cyclotron, Betatron	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	11/08/21	DSP
		Total hours:15			
	Internal Assessment Test/Quiz/Assignment – 01				

Unit 3: NUCLEAR REACTIONS AND PARTICLE PHYSICS					
Name of the Faculty: Prof. Badrinath					
9	NUCLEAR REACTIONS : Types of reactions, Conservation laws in nuclear reactions with examples, derivation of Q – value for reactions using the energy – momentum conservation, exoergic and endoergic reactions, threshold energy , reaction rate, reaction cross – section, concept of direct and compound reactions, resonance reaction; Power reactors	8 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	03/05/21 To 05/07/21	CGB
10	ELEMENTARY PARTICLES : Classification of elementary particles, Fundamental interactions (Gravitational, Electromagnetic, Weak, strong – range, relative strength, particle interactions for each); Symmetries and Conservation Laws (momentum, energy, charge, parity, lepton number, baryon number, isospin, strangeness and charm); Concept of Quark Model, Color quantum number and gluons;	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	06/07/21 To 19/08/21	CGB
		Total hours :	15		

Signature of Faculty

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Chand

Prof. Badrinath
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LESSON PLAN FOR THE ACADEMIC YEAR 2020-21

Criterion 01
Metric -1.1.1

Programme: B.Sc.

Course/Paper Name: ELECTRONICS, MAGNETIC MATERIALS, DIELECTRICS AND QUNTUM MECHANICS – II PHYSICS

Semester: VI sem 603

Class: III B.Sc

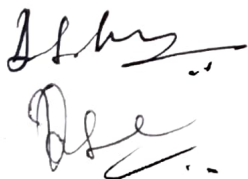
Total Hours:

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: OPAMPS		Name of the Faculty: Prof. Purnima			
1	Operational amplifiers Block Diagram of an OPAMP, Characteristics of an Ideal and Practical Operational Amplifier (IC 741), Open loop configuration - Limitations, Gain Bandwidth Product, Frequency Response, CMRR, Slew Rate and concept of Virtual Ground	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	03/05/21 To 15/05/21	DSP
2	Feedback concepts, Advantages of feedback, types of feedback, Expression for Gain; OPAMP as a feedback amplifier – Non – Inverting and Inverting amplifier, Modification of input and output impedances with feedback ; Voltage follower; Differential amplifier with feedback;	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	16/05/21 To 28/06/21	DSP
3	Linear Applications - frequency response of Low pass, high pass and band pass filters (first order), inverting summing amplifier, ideal Differentiator, Integrator;	2 Hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	29/05/21 To 10/06/21	DSP
4	OPAMP Oscillators Positive Feedback concept - oscillator operation – Barkhausen Criterion; Types of oscillator circuits (Qualitative); Phase shift oscillator and Wien bridge oscillator (using op amp).	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	11/06/21 To 27/06/2021	DSP

5	DIGITAL ELECTRONICS Number Systems: binary, octal, hexadecimal (interconversions); Number codes : BCD, Gray Code (conversions to other systems); Signed Numbers; Arithmetic using Radix and Radix -1 complement.	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	28/06/21 To 14/07/21	
6	Logic gates and truth tables : OR gate, AND gate; Inverter (the NOT function); NAND and NOR; exclusive OR; exclusive NOR.	1 hour	Black board/ Lecture PPT/Group Discussion/ Seminar.	15/07/21 To 29/07/21	DSP
7	Boolean laws and theorems – simplification of SOP equations; Realization of AND, OR, NOT using universal gates NAND and NOR;	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	30/07/21 To 09/08/21	DSP
8	Combination logic: Adders (full and half adder) and Subtractors (half)	2 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	10/08/21 to 19/08/21	DSP
		Total hours:15			
Unit 2 : Magnetic Properties of Matter and Dielectrics Name of the Faculty: Dr. Vasu					
9	Magnetic Properties of Matter Review of basic formulae : Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, magnetization (M), Classification of Dia – , Para – , and ferro – magnetic materials;	3 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	03/05/21 To 28/06/21	VS
10	Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Para magnetism. Curie’s law, Weiss’s Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss, Hard and Soft magnetic materials	5 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	29/05/21 To 14/07/21	VS
11	Dielectrics: Static dielectric constant, polarizability (electronic, ionic and orientation), calculation of Lorentz field (derivation), Clausius-Mosotti equation (derivation), dielectric breakdown, electrostriction (qualitative), electrets. Piezo electric effect, cause, examples and applications.	7 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	15/07/21 To 19/08/21	VS
		Total hours:15			
Internal Assessment Test/Quiz/Assignment – 01					

Unit 3: Quantum mechanics-II		Name of the Faculty: Prof. prof. Badrinath			
12	The concept of wave function, physical significance of wave function. Development of time dependent and time independent Schrodinger's wave equation. Max Born's interpretation of the wave function. Normalization and expectation values, Quantum mechanical operators, Eigen values and Eigen functions. Applications of Schrodinger's equation – free particle, particle in one dimensional box- derivation of Eigen values and Eigen function – extension to three dimensional box; Development of Schrodinger's equation for One dimensional Linear harmonic oscillator, Rigid rotator, Hydrogen atom – mention of Eigen function and Eigen value for ground state.	15 hours	Black board/ Lecture PPT/Group Discussion/ Seminar.	03/05/21 To 19/08/21	CGB
Total hours :		15			

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