

GOVERNMENT OF KARNATAKA
DEPARTMENT OF COLLEGIATE EDUCATION
GOVERNMENT FIRST GRADE COLLEGE CHANNAPATNA
LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2020

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc [P C M]

Course/Paper Name: Physics 101

Semester: 1

Class: 1 B Sc

Name of the Faculty: Dr.K.Y.Madhavi, J.Nagaraju, Dr.V.Sivaprasad, Venkata Subba Reddy, T. Ramesh,

Total Hours:52

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/ pedagogy	Date	Initial
Unit 1: MECHANICS-1 (13) HOURS T. Ramesh/ Dr.V.Sivaprasad					
1	MOTION : Newton's Laws of Motion (Statement and illustration), Motion in a resistive medium; Drag force & Drag Coefficient,	2	Black board/ Lecture PPT	July 2019	
2	Drag force with v dependence (only vertical) and v^2 dependence (only vertical) – derivation for velocity and position- graphs with and without resistance, concept of terminal velocity	2	Black board/ Lecture	July 2019	
3	FRICITION : Static and Dynamic Friction – Friction as a self adjusting force, Coefficient of Static and dynamic friction; Expression for acceleration of a body moving along an inclined plane with and without friction,	2	Black board/ Lecture PPT	August 2019	
4	Free Body Diagrams for the following cases (i)Two masses connected by a string hanging over a frictionless pulley (ii)Two masses in contact and masses connected by strings (horizontal only) (iii)Two masses connected by a string passing over	2	Black board/ Lecture	August 2019	

	a frictionless pulley fixed at the edge of a horizontal table.				
5	PLANETARY & SATELLITE MOTION : Motion along a curve - radial and transverse components of acceleration(derivation); Newton's law of gravitation (vector form only),	2	Black board/ Lecture PPT	September 2019	
6	Kepler's laws (statements only);Gravitational Field and Potential – relation between them; Field and Potential due to a solid sphere (derivation);	2	Black board/ Lecture	September 2019	
7	Orbital and Escape Velocity (derivation), Satellite in circular orbit and applications; Geostationary and Geosynchronous orbits. [5 hours]	1	Black board/ Lecture	October 2019	
		Total hours:13			
Unit 2 : MECHANICS-1 (13 HOURS) M.Venkata Subba Reddy					
8	WORK & ENERGY :Work done by a constant and variable force; Work energy theorem; Work and potential energy; examples of potential energy;	2	Black board/ Lecture PPT	July 2019	
9	Work done by gravitational force; Work done by a spring force; Conservative and non – conservative force; Conservation of mechanical energy	2	Black board/ Lecture	July 2019	
10	SYSTEM OF PARTICLES :Centre of mass of rigid bodies – General expression; Newton's law for a system of particles; Linear momentum for a particle and a system of particles;	2	Black board/ Lecture PPT	August 2019	
11	Conservation of linear momentum; System with varying mass; Single stage Rocket motion – Velocity & Acceleration with and without gravity; Elastic and inelastic collisions (only 2D)	2	Black board/ Lecture	August 2019	
12	BLACK BODY RADIATION : Black body radiation and its spectral energy distribution;	2	Black board/ Lecture PPT	September 2019	

	Kirchhoff's law, Stefan-Boltzmann's law, Wien's displacement law, Rayleigh-Jeans law (Statements),				
13	Derivation of Planck's law – deduction of Wien's Law & Rayleigh – Jeans Law, Solar constant and its determination using Angstrom's Pyrheliometer; Estimation of the surface temperature of the sun	3	Black board/ Lecture	October 2019	
		Total hours:13			
	Internal Assessment Test/Quiz/Assignment – 01	September 2019			
Unit 3: THERMODYNAMICS-1 (13 HOURS) J.Nagaraju					
14	KINETIC THEORY OF GASES :Basic assumptions of kinetic theory; Derivation of - deduction of perfect gas equation; Maxwell's law of distribution of velocity (without derivation)-	2	Black board/ Lecture PPT	July 2019	
15	deduction of most probable velocity, mean velocity and root mean square velocity; Derivation of expression for mean free path ;	2	Black board/ Lecture	July 2019	
16	Degrees of freedom and principle of equipartition of energy; Derivation of , Specific heats of an ideal gas, atomicity of gases 6 hours	2	Black board/ Lecture	August 2019	
17	TRANSPORT PHENOMENA : Viscosity and thermal conduction in gases (with derivation) ;Relation between coefficient of viscosity and coefficient of thermal conductivity of a gas	2	Black board/ Lecture PPT	August 2019	
18	Real Gases : Derivation of van der Waal's equation of state; Andrews experiments on Carbon dioxide;	3	Black board/ Lecture PPT	September 2019	
19	Derivation of the critical constants; Comparison of van der Waal's isotherms with Andrew's isotherms	2	Black board/ Lecture	October 2019	
	Total hours :	13			
Unit 4: Thermodynamics-1 (13 HOURS) Dr.K.Y.Madhavi					

20	<p>Basic Concepts and the Zeroth law of thermodynamics</p> <p>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 - PV indicator diagrams</p>	3	Black board/ Lecture PPT	July 2019	
21	<p>First Law of Thermodynamics</p> <p>The first law of Thermodynamics; Sign convention for heat and work; Derivation of equation of state $PV^\gamma = \text{const}$; Work done in an isothermal and adiabatic 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.</p>	3	Black board/ Lecture PPT	August 2019	
22	<p>Second Law of Thermodynamics</p> <p>Reversible and irreversible processes; Carnot Engine; Carnot Cycle and its efficiency (with derivation); Second law of thermodynamics (Kelvin's & Clausius' statements and their equivalence);</p>	2	Black board/ Lecture PPT	August 2019	
	<p>Practical internal combustion engines - Otto and Diesel Cycles (qualitative treatment); Carnot theorem (proof); Refrigerator-Coefficient of performance</p>	2	Black board/ Lecture	September 2019	
23	<p>Entropy</p> <p>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 of entropy; Entropy change in (i) adiabatic process (ii)</p>	3	Black board/ Lecture PPT	September/October 2019	

	free expansion (iii) cyclic process (iv) isobaric process; TdS diagram of a Carnot cycle; Entropy and disorder				
	Total hours :	13			
	Internal Assessment Test/Quiz/Assignment – 02			October2019	
	Date of submission of IA Marks :November 2019				

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LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2020

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc [P C M]

Course/Paper Name: Physics 201

Semester: 2

Class: 1 B Sc

Name of the Faculty: Dr.K.Y.Madhavi, J.Nagaraju, Dr.V.Sivaprasad, Venkata Subba Reddy,
T. Ramesh,

Total Hours:52

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/ pedagogy	Date	Initial
Unit 1: MECHANICS-2 (13) HOURS T. Ramesh/ Dr.V.Sivaprasad					
1	OSCILLATIONS SHM ; Differential equation of SHM and its solutions, Kinetic and Potential energy Simple and compound pendulum	2	Black board/ Lecture PPT	Jan 2020	
2	Oscillations of two masses connected by a spring; damped oscillations – over damped, under damped and un-damped oscillations; forced oscillations	2	Black board/ Lecture	Feb 2020	
3	Concept of resonance; Coupled Oscillators - in phase and out of phase oscillations- energy transfer.	2	Black board/ Lecture PPT	Feb 2020	
4	ELASTICITY Hooke's law, Stress – Strain diagram, definitions of three elastic moduli; Relationship between three elastic constants (derivation); Poisson's ratio	3	Black board/ Lecture	Mar 2020	
5	Work done in stretching a wire; Bending of beams; Bending moment	2	Black board/ Lecture PPT	March/A pril 2020	

6	Theory of single cantilever, Couple per unit twist, Torsional oscillations	2	Black board/ Lecture	Aril 2020	
		Total hours:13			
Unit 2 : THERMODYNAMICS-2 (13 HOURS) M.Venkata Subba Reddy					
8	THERMODYNAMIC POTENTIALS Internal-Energy;Enthalpy; Helmholtz free energy, Gibbs free energy and their significance; Maxwell's thermodynamic relations and their significance	2	Black board/ Lecture PPT	Jan 2020	
9	TdS relations; Energy equations and Heat Capacity equations; Third law of thermodynamics (Nernst Heat theorem)	2	Black board/ Lecture	Jan 2020	
10	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	Black board/ Lecture PPT	Feb 2020	
11	Low Temperature Physics : Methods of producing low temperatures: (i) Joule Thomson (Joule Kelvin / Throttling / Porous plug) experiment, Joule Thomson Coefficient, inversion temperature	3	Black board/ Lecture	Feb/Mar 2020	
12	Adiabatic demagnetization - working and theory	1	Black board/ Lecture PPT	Mar 2020	
13	Liquefaction of gases : Regenerative cooling coupled with Joule Thomson cooling; Adiabatic expansion with Joule Thomson cooling (qualitative)	2	Black board/ Lecture	Apr2020	
		Total hours:13			

	Internal Assessment Test/Quiz/Assignment – 01			Mar 2020	
Unit 3: MECHANICS-2 (13 HOURS) J.Nagaraju					
14	Frames of reference : Inertial and Non inertial frames of reference - Importance of Inertial frame, Linearly accelerated frames, Concept of frame dependent forces;	2	Black board/ Lecture PPT	Jan 2020	
15	Galilean relativity - Transformation of Position, Distance/Length, Velocity (Non-relativistic velocity addition theorem), Acceleration; Principle of Invariance, Michelson – Morley Experiment, Search for ether	3	Black board/ Lecture	Feb/Mar 2020	
16	Special Theory Of Relativity Postulates of the special theory of relativity;	1	Black board/ Lecture	Feb2020	
17	Lorentz Transformations – Length Contraction, Time Dilation – twin paradox	3	Black board/ Lecture PPT	Mar 2020	
	Velocity Addition Theorem; Variation of mass with velocity; Mass – Energy equivalence	4	Black board/ Lecture PPT	Mar/April 2020	
	Total hours :	13			
Unit 4: Mechanics-2 (13 HOURS) Dr.K.Y.Madhavi					
20	Moment Of Inertia : Review of rotational motion of Rigid bodies	2	Black board/ Lecture PPT	Jan 2020	
21	Kinetic energy of rotation-Moment of Inertia of a body	1	Black board/ Lecture PPT	Jan 2020	
22	Theorem of Moment of Inertia-Parallel and perpendicular axes theorem with proofs.	2	Black board/ Lecture PPT	Jan/Feb 2020	
	Calculation of moment of inertia of a disk, annular ring, solid sphere and rectangular bar	3	Black board/ Lecture	Feb 2020	
23	Conservation of angular momentum with illustrations.	1	Black board/ Lecture PPT	Mar 2020	
	Waves Wave Equation, Speed of transverse waves on a uniform	3	Black board/ Lecture PPT	Mar 2020	

	string Speed of longitudinal waves in a fluid				
	Group velocity and Phase velocity – relation between	1	Black board Lecture	Apr 2020	
	Total hours :	13			
	Internal Assessment Test/Quiz/Assignment – 02			Apr2020	
	Date of submission of IA Marks :April 2020				

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(ANNEXURE-1.2)

Criterion 01
(Metric -1.1.1)

Programme: B.Sc. PCM

Course/Paper Name: Physics 301

Semester: 3

Class: B.Sc.

Name of the Faculty: Dr.K.Y.Madhavi, J.Nagaraju, Dr.V.Sivaprasad, T. Ramesh Total Hours: 52

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:DC CIRCUIT ANALYSIS and Transient currents (13 hours) Dr.V.Sivaprasad					
1	Concept of Voltage and Current Sources, Kirchoff's Current Law, Kirchoff's Voltage Law (statements). Principle of Duality(voltage and current source equivalents).	2	Lecture using Black Board	July, 2019	
2	Thevenin's Theorem (statement and proof)	1	Lecture using Black Board	July 2019	
3	Norton's Theorem (Statement and explanation)	1	Lecture using Black Board	July, 2019	
4	Superposition Theorem(statement and proof)	1	Lecture using Black Board	August, 2019	
5	Reciprocity Theorem. Maximum Power Transfer Theorem (statement and proof).	1	Lecture using Black Board	August 2019	
6	Problems on the above theorems	2	Lecture using Black Board	August, 2019	
7	Self-inductance – definition, explanation, expression $L = \frac{\mu N^2 A}{l}$; Magnetic field energy stored in an inductor;	2	Lecture using Black Board	September 2019	
8	Growth and decay of charge in series RC circuit	1	Lecture using Black Board	September, 2019	
9	Growth and decay of current in series LR circuit	1	Lecture using Black Board	September 2019	

10	Decay of charge in series LCR circuit - Damped, under-damped and over-damped conditions	1	Lecture using Black Board	October, 2019	
		Total hours:	13		
Unit 2 : Magnetic Field and Forces (13 hours) J.Nagaraju					
	Force on a moving charge in a magnetic field, Lorentz force and definition of \mathbf{B} , force on a current carrying conductor in uniform magnetic field, Force between parallel conductors; Definition of ampere	3	Lecture using Black Board	July, 2019	
	Biot – Savart’s law, Magnetic field due to a straight current carrying conductor (Derivation for Finite/Infinite Length, Amperes swimming rule, Right hand palm rule)	3	Lecture using Black Board	July/ August 2019	
	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)	3	Lecture using Black Board	August 2019	
	Principle and theory of a moving coil BG, Concept of dead beat galvanometer, determination of high resistance by leakage, theory of HTG	3	Lecture using Black Board	September 2019	
	Ampere's Circuital law (statement), Application of Ampere's law to straight wire, solenoid and toroid	1	Lecture using Black Board	October, 2019	
		Total hours:	13		
	Internal Assessment Test/Quiz/Assignment – 01	September 2019			
Unit 3: Scalar and vector fields, ELECTROMAGNETIC WAVES (13 HOURS) T. Ramesh					
	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	3	Lecture using Black Board	July, 2019	

	divergence and curl (statements only).				
	Equation of Continuity, Displacement Current, Maxwell's equations in differential form (Derivation and physical significance)	3	Lecture using Black Board	August 2019	
	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	3	Lecture using Black Board	September 2019	
	Poynting Vector, Energy density in electromagnetic field, Momentum and Pressure of em waves (derivation)	3	Lecture using Black Board	October, 2019	
	Electromagnetic waves in a conducting medium – skin effect and skin depth	1	Lecture using Black Board	October, 2019	
	Total hours :	13			
Unit 4: ALTERNATING CURRENT and THERMOELECTRICITY (13 HOURS) Dr.K.Y.Madhavi					
	rms and average value of ac – definition and expressions, Representation of sinusoids by complex numbers	1	Lecture using Black Board	July, 2019	
	Response of LR, CR and LCR series circuit to sinusoidal voltage – j operator method, series and parallel resonant (LR parallel C) circuits expression for Q factor, band width, AC bridge - Maxwell bridge	5	Lecture using Black Board	July/August, 2019	
	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	3	Lecture using Black Board	August/September, 2019	

	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' Radio-micrometer, thermopile and thermoelectric pyrometer (brief explanation with experimental setup).	4	Lecture using Black Board	October, 2019	
	Total hours :	13			
	Internal Assessment Test/Quiz/Assignment – 02	October2019			
	Date of submission of IA Marks : November 2020				

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(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: B.Sc. PCM

Course/Paper Name: Physics 401

Semester: 4

Class: B.Sc.

Name of the Faculty: Dr.K.Y.Madhavi, J.Nagaraju, M Venkata SubbaReddy T. Ramesh

Total Hours:52

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1:INTERFERENCE (13 hours) T RAMESH					
1	Wave Theory: 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 angle of incidence = angle of reflection using Huygen's construction, derivation of Snell's law and $\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$).	3	Lecture using Black Board and PPT	Jan 2020	
2	Interference - a review Coherent sources and their production, conditions for observing interference. (What are coherent sources, why they need to be derived from same source by Amplitude Division and Wavefront Division). Conditions for Constructive and destructive interference (mention)	1	Lecture using Black Board and PPT	Jan / Feb 2020	
3	Coherent sources by wavefront division : Biprism-theory and working-(derive expression for β , interference with white light) experiment to determine wavelength. Effect of thin film or glass plate in the path of one of the beams (derive expression), calculation	5	Lecture using Black Board and PPT	Feb/ March 2020	

	of (refractive index or) thickness of plate.				
4	Coherent sources by amplitude division: Interference at thin films - reflected and transmitted light (derivation of condition for destructive and constructive interference). Colors of thin films. Theory and experiment of air wedge (derive expression). Theory and experiment of Newton's rings (derivation of expression for λ in terms of diameter of fringes in the reflected system).	4	Lecture using Black Board and PPT	March/ April 2020	
		Total hours:	13		
Unit 2 : DIFFRACTION (13 hours) J.Nagaraju					
5	Fresnel diffraction – Division of wavefront into Fresnel's half period zones derive resultant displacement/amplitude -theory of rectilinear propagation using these ideas. Construction and working of Zone plate - comparison of Zone plate with lens. Theory of diffraction at a straight edge	7	Lecture using Black Board and PPT	Jan and Feb 2020	
6	Fraunhofer diffraction : Theory of single slit diffraction – (expression for amplitude, positions of maxima & minima, graphical method for determining roots of equation $\tan\beta = \beta$). Theory of grating - normal and oblique incidence - experimental determination of wavelength. Discussion of Dispersive power(Definition and expression for the dispersive power of a grating), Resolution, Rayleigh's criterion (Statement and explanation) - expression for resolving power of grating and telescope (derivation), comparison of prism and grating spectra.	6	Lecture using Black Board and PPT	March and April 2020	
		Total hours:	13		
	Internal Assessment Test/Quiz/Assignment – 01		March 2020		
Unit 3: LASERS AND POLARISATION (13 HOURS) Dr V Shivaprasad					

	<p>Polarisation 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</p>	6	Lecture using Black Board and PPT	March and April 2020	
	<p>Lasers : Introduction characteristics - spontaneous & stimulated emission- Einstein's coefficients and optical amplification Main components of a laser - lasing action. Ruby Laser - construction and working - energy level diagram. HeNe Laser - construction and working - energy level diagram Spatial Coherence and directionality, estimates of beam intensity, temporal coherence and spectral energy density</p>	7	Lecture using Black Board and PPT	Jan and Feb 2020	
Total hours :	13				
Unit 4: FOURIER SERIES AND OPTICAL FIBRES (13 HOURS) Dr.K.Y.Madhavi					
	<p>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</p>	2	Lecture using Black Board and PPT	Jan and Feb 2020	
	<p>Series for (i) $f(x)=e^x$ if $-\pi < x < \pi$ (ii) $f(x)=-1$ $-\pi \leq x \leq 0$ $1 \leq x \leq \pi$</p>	3			

	(iii) $f(x)=x^2 \in \text{the interval } [-1,+1]$				
	Concept of change of scale; Fourier Series for Periodic Rectangular Wave; Half – Wave rectifier; Trapezoidal wave Application to Square wave, triangular Wave and Saw Tooth Wave (superposition of first three components to be shown graphically)	4			
	Fiber Optics 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	Lecture using Black Board and PPT	March and April 2020	
	Total hours :	13			
	Internal Assessment 02	April 2020			
	Date of submission of IA Marks : In the month of May 2020				

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LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2021

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc (PCM)

Course/Paper Name: PHYSICS 501

Semester: 5

Class: III B.Sc

Name of the Faculty: Dr.K.Y.Madhavi, J. Nagaraju, T.Ramesh

Total Hours: 45 Hours

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: STATISTICAL PHYSICS (15 HOURS)		T.Ramesh			
1	Specification of state of the system, Macrostate, Microstate, Phase Space, Stirling's Approximation, Thermodynamic Probability and its calculation (Description of each with an example), Entropy & Thermodynamic probability ($S=k \ln \Omega$). Basic postulates of Statistical Physics ; Ensemble (Micro – canonical, canonical & grand canonical ensembles)	2	Lecture using Black Board and PPT	July 2019	
2	Maxwell–Boltzmann Distribution function (Derivation of $n_i = \frac{g_i}{e^{(\alpha + \beta E_i)}}$) Energy distribution function [$f(E_i) = \frac{n_i}{g_i}$]	1	Lecture using Black Board	July 2019	
3	Maxwell – Boltzmann law of velocity distribution (mention- most probable velocity, average velocity, rms velocity) Limitations of M – B statistics)	2	Lecture using Black Board	August 2019	
4	B-E distribution function (Derivation of $n_i = \frac{g_i}{e^{(\alpha + \beta E_i) - 1}}$) Bose-Einstein Condensation properties of liquid He (qualitative) [Mention of Bose Temperature T_B –Concept of BE Condensation –variation of No with temperature - BE condensation	3	Lecture using Black Board and PPT	August 2019	

	properties of Liquid He4 (Qualitative description)]				
5	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 capacity of solids – [Derivation of the equation where $\theta = hv/k$]	2	Lecture using Black Board	September 2019	
6	Fermi-Dirac distribution function; Fermi sphere and Fermi energy, Fermi gas	3	Lecture using Black Board	September 2019	
7	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	2	Lecture using Black Board and Seminar	October 2019	
	Total hours:	15			
Unit 2 :QUANTUM MECHANICS -1 (15 HOURS) Dr. K.Y.Madhavi					
10	Failure of Classical Physics to explain the phenomena such as stability of atom, atomic spectra, black body radiation, , Explanation of the above effects on the basis of quantum mechanics	2	Lecture using Black Board and PPT	July 2019	
11	Failure of Classical Physics to explain photoelectric effect, Compton effect and specific heat of solids, Planck's quantum theory Explanation of the above effects on the basis of quantum mechanics	3	Lecture using Black Board and PPT	July 2019	
12	de Broglie's hypothesis of matter waves (λ in terms of momentum, energy, temperature for monoatomic gas molecules); Concept of wave packet, Group velocity and particle velocity (relation between group velocity and particle velocity)	4	Lecture using Black Board	August 2019	
13	Thomson's experiment; Davisson and Germer's experiment – normal incidence method;	2	Lecture using Black Board	September 2019	
14	Heisenberg's uncertainty principle - different forms; Gamma ray microscope experiment; Application to Non – existence of electron in nucleus	4	Lecture using Black Board and Seminar	September/October 2019	
	Total hours:	15			

	Internal Assessment Test/Quiz/Assignment – 01			September 2019	
	Unit 3: ATMOSPHERIC PHYSICS AND NANO MATERIALS (15 HOURS) J.Nagaraju				
15	Fixed gases and variable gases; Temperature structure of the atmosphere; Hydrostatic balance	2	Lecture using Black Board	July 2019	
16	Variation of pressure with altitude, scale height; Relative and Absolute humidity	2	Lecture using Black Board	July 2019	
17	Beer's law (derivation); Global energy balance for earth – atmosphere system, Greenhouse effect; Atmosphere dynamics	2	Lecture using Black Board	August 2019	
18	Accelerated rotational frames of reference – Centripetal and Coriolis force (derivation), Gravity and pressure gradient forces (with derivation),	2	Lecture using Black Board	August 2019	
19	Applications of Coriolis force – Formation of trade winds, cyclones, erosion of river banks	2	Lecture using Black Board	September 2019	
20	Nano Materials 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). Characterization techniques- (brief description of SEM, TEM, AFM).	2	Lecture using Black Board and PPT	September 2019	
21	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.	2	Lecture using Black Board and PPT	October 2019	
22	Distinct properties of nano materials (Mention- optical, electrical, mechanical and magnetic properties Mention of applications: (Fuel cells, catalysis, phosphors for HD TV, next generation computer chips, elimination of pollutants, sensors	2	Lecture using Black Board and seminar	October 2019	
	Total hours :				
	Internal Assessment Test/Quiz/Assignment – 02			October 2019	

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LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2021

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc (PCM)

Course/Paper: Physics 503

Semester: 5

Class: III B.Sc

Name of the Faculty: Dr.V. Shivaprasad, J. Nagaraju, M. Venkata Subba Reddy

Total Hours: 45 Hours

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: ASTROPHYSICS (15 HOURS) J. Nagaraju					
1	Helio-centric parallax, Definition of parsec (pc), Astronomical unit (AU), light year (ly) and their relations) Apparent brightness, Apparent magnitude - scale of Hipparchus. Absolute magnitude - distance - modulus relationship. Distinction between visual and bolometric magnitudes, Radius of a star.	3	Ex: Black board/ Lecture PPT/Group Discussion/ Seminar/Case studies.	July 2019	
2	Pickering classification and Yerke's luminosity classification. H-R diagram, Main sequence stars and their general characteristics	2	Lecture using Black Board	July/August 2019	
3	Gravitational potential energy or self energy of a star based on the linear density model, Statement and explanation of Virial theorem	2	Lecture using Black Board	August 2019	
4	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.	3	Lecture using Black Board and PPT	September 2019	
5	Stages of star formation (GMC - Protostar- T-Tauri) and main	2	Lecture using Black Board	September 2019	

	sequence evolution, White dwarfs, Pulsars				
6	Neutron stars and Black holes, Variable stars, Supernova explosion-its types, Chandrasekhar limit. Event Horizon, Singularity, Schwarz child radius (qualitative)	3	Lecture using Black Board	October 2019	
		Total hours:	15		
Unit 2 :SOLID STATE PHYSICS (13 HOURS) Dr. V. Shivaprasad					
10	Crystal systems-Bravais lattice; Miller indices– Spacing between lattice planes of cubic crystals	2	Lecture using Black Board and PPT	July 2019	
11	Continuous and characteristic X-ray spectra; Moseley's law, Scattering of X-rays	2	Lecture using Black Board and PPT	July 2019	
12	Compton effect, Bragg's law.	2	Lecture using Black Board	August 2019	
13	Electrical conductivity- classical theory (Drude-Lorentz model); Thermal conductivity; Wiedemann - Franz's law	2	Lecture using Black Board	August 2019	
14	Density of states for free electrons (with derivation); Fermi-Dirac distribution function and Fermi energy	2	Lecture using Black Board	September 2019	
15	Expression for Fermi energy and Kinetic energy at absolute zero(derivation). Hall Effect in metals	2	Lecture using Black Board	September 2019	
	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	Lecture using Black Board and Seminar	October 2019	
		Total hours:	15		
	Internal Assessment Test/Quiz/Assignment – 01			September 2019	
Unit 3:SEMICONDUCTOR PHYSICS (15 HOURS) M. Venkata Subba Reddy					
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	3	Lecture using Black Board	July 2019	

	holes and electrons) and electrical conductivity				
16	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 depletion region, drift and diffusion current –expression for diode current.	3	Lecture using Black Board	July/ August 2019	
17	Zener diode – characteristics and its use as a voltage regulator. Photo diodes, Solar cells and LED (principle, working and applications).	4	Lecture using Black Board	August / September 2019	
18	Characteristics (CE mode), DC Biasing , Load line analysis (Operating Point, Fixed Bias)	1	Lecture using Black Board	September 2019	
19	Forward bias of Base – Emitter, collector – emitter loop, transistor saturation, Load line analysis ; Voltage divider bias – Transistor saturation, Load line analysis)	2	Lecture using Black Board	October 2019	
20	Transistor as an amplifier(CE mode); . H-parameters	2	Lecture using Black Board and PPT	October 2019	
	Total hours :	15			
	Internal Assessment Test/Quiz/Assignment – 02			October 2019	

GOVERNMENT OF KARNATAKA
DEPARTMENT OF COLLEGIATE EDUCATION
GOVERNMENT FIRST GRADE COLLEGE CHANNAPATNA
LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2020

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc (PCM)

Course/Paper Name: PHYSICS 601

Semester: 6

Class: III B.Sc

Name of the Faculty: Dr.K.Y.Madhavi, J. Nagaraju, T.Ramesh

Total Hours: 45 Hours

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: ATOMIC AND MOLECULAR PHYSICS (15 HOURS) J. Nagaraju					
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.	2	Lecture using Black Board and PPT	Jan 2020	
	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),	3	Lecture using Black Board and PPT	Jan 2020	
	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.	3	Lecture using Black Board and PPT	Feb 2020	
	Zeeman Effect- Experimental study, theory of normal and anomalous Zeeman effect based on quantum theory.	2	Lecture using Black Board and PPT	Feb/March 2020	
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	5	Lecture using Black Board /PPT	March/April 2020	

	scattering. Experimental study of Raman effect, Quantum theory of Raman effect - Applications				
		Total hours:	15		
Unit 2 :NUCLEAR PHYSICS (15 HOURS) Dr.K.Y.Madhavi					
10	Alpha particle scattering : Rutherford's theory of alpha scattering (assuming the path to be hyperbolic)	2	Lecture using Black Board and PPT	Jan 2020	
11	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	Lecture using Black Board and PPT	Jan 2020	
12	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 Derivation of Q-value-of alpha decay; Exact energy of alpha particle emitted	3	Lecture using Black Board and PPT	Feb 2020	
	Beta decay : Types of beta decay (electron, positron decay and electron capture) Characteristics of beta spectrum and Pauli's neutrino hypothesis	2	Lecture using Black Board and PPT	March 2020	
	Detectors : Variation of ionization current with applied voltage in a gas counter, Proportional counter, GM Counter (Construction, working, characteristics, efficiency and quenching)	5	Lecture using Black Board and PPT	March/April 2020	

	Particle accelerators : Linear accelerator, Cyclotron, Betatron				
		Total hours:	15		
	Internal Assessment Test/Quiz/Assignment – 01			March 2020	
Unit 3: NUCLEAR REACTIONS AND PARTICLE PHYSICS (15 HOURS) T Ramesh					
15	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	4	Lecture using Black Board and PPT	Jan 2020	
16	Reaction rate, reaction cross – section, concept of direct and compound reactions, resonance reaction; Power reactors.	4	Lecture using Black Board and PPT	Feb 2020	
	Classification of elementary particles, Fundamental interactions (Gravitational, Electromagnetic, Weak, strong – range, relative strength, particle interactions for each);	4	Lecture using Black Board and PPT	March 2020	
17	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	3	Lecture using Black Board and PPT	April 2020	
	Total hours :	15			
	Internal Assessment Test/Quiz/Assignment – 02			April2020	
	Date of submission of IA Marks May 2020				

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LESSON PLAN FOR THE ACADEMIC YEAR 2015-16 TO 2019-2020

(ANNEXURE-1.2)

Criterion 01

(Metric -1.1.1)

Programme: BSc (PCM)

Course/Paper Name: PHYSICS 603

Semester: 6

Class: III B.Sc

Name of the Faculty: Dr.V Shivaprasad, J. Nagaraju, M Venkata Subba Reddy

Total Hours: 45 Hours

Sl. No.	Topic covered	No. of Lecture Hours	Methodology/pedagogy	Date	Initial
Unit 1: OP AMPS (15 HOURS) M Venkata Subba Reddy					
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	Lecture using Black Board and PPT	January 2020	
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	Lecture using Black Board/PPT	January 2020	
3	Linear Applications Frequency response of Low pass, high pass and band pass filters (first order), inverting summing amplifier, ideal Differentiator, Integrator	2	Lecture using Black Board /PPT	February 2020	
4	OPAMP Oscillators Positive Feedback concept - oscillator operation –Barkhausen Criterion; Types of oscillator circuits (Qualitative); Phase shift oscillator	2	Lecture using Black Board /PPT	February 2020	

	and Wien bridge oscillator (using op amp). 2				
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. Logic gates and truth tables : OR gate, AND gate; Inverter (the NOT function); NAND and NOR; exclusive OR; exclusive NOR.	3	Lecture using Black Board/PPT	March 2020	
6	Logic gates and truth tables Boolean laws and theorems, simplification of SOP equations; Realization of AND, OR, NOT using universal gates NAND and NOR. Combination logic: Adders (full and half adder) and Subtractors (half)	4	Lecture using Black Board /PPT	March/ April 2020	
		Total hours:	15		
Unit 2 : MAGNETIC PROPERTIES OF MATTER AND DIELECTRICS (15 HOURS) Dr.V Shiva Prasad					
7	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	Lecture using Black Board and PPT	January 2020	
8	Classical Langevin Theory of dia – and Paramagnetic Domains. Quantum Mechanical Treatment of Paramagnetism.	2	Lecture using Black Board	February 2020	
9	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	3	Lecture using Black Board /PPT	February 2020	
10	Dielectrics :	3	Lecture using Black Board /PPT	March 2020	

	Static dielectric constant, polarizability (electronic, ionic and orientation), calculation of Lorentz field (derivation)				
11	Clausius-Mosotti equation (derivation), dielectric breakdown, electrostriction (qualitative), electrets. Piezo electric effect, cause, examples and applications	4	Lecture using Black Board and PPT	March/April 2020	
		Total hours:	15		
	Internal Assessment Test/Quiz/Assignment – 01			March 2020	
Unit 3 QUANTUM MECHANICS -II (15 HOURS) J Nagaraju					
12	The concept of wave function, physical significance of wave function. Development of time dependent and time independent Schrodinger's wave equation	4	Lecture using Black Board /PPT	January 2020	
13	Max Born's interpretation of the wave function. Normalization and expectation values, Quantum mechanical operators, Eigen values and Eigen functions.	4	Lecture using Black Board /PPT	February 2020	
14	Applications of Schrodinger's equation Free particle, particle in one dimensional box- derivation of Eigen values and Eigen function – extension to three dimensional box;	3	Lecture using Black Board /PPT	March 2020	
15	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.	4	Lecture using Black Board	April 2020	
		Total hours :	15		
	Internal Assessment Test/Quiz/Assignment – 02			April 2020	

Signature of Faculty

Signature of HOD

Principal