CENTURION UNIVERSITY OF TECHNOLOGY AND MANAGEMENT, ODISHA

SCHOOL OF BASIC SCIENCES

3-YEAR B.Sc. PROGRAMME
IN
APPLIED PHYSICS

1st YEAR SYLLABUS

SEMESTER-I				
Sl No	**Subject Code**	**Subject**	**Contact Hours per week (L+T+P)**	**Credits**
1		English Communications/ Environmental Science	2+0+0	2
2		C1 Mathematical Physics	4+0+2	6
3		C2 Mechanics	4+0+2	6
4		GE-1	4+0+2	6
TOTAL CREDITS				20

SEMESTER-II				
Sl No	**Subject Code**	**Subject**	**Contact Hours per week (L+T+P)**	**Credits**
1		English Communications/ Environmental Science	2+0+0	2
2		C3 Thermal Physics	4+0+2	6
3		C4 Wave optics	4+0+2	6
4		GE-2	4+0+2	6
TOTAL CREDITS				20

M.I.L 101 M.I.L (Odia) (2-0-0)

FIRST SEMESTER

(ଆଧୁନିକ ଭାରତୀୟ ଭାଷା, ଓଡିଆ)

ଆଧୁନିକ ଭାରତୀୟ ଭାଷା (ଓଡିଆ) ପାଠ୍ୟକ୍ରମ ପାଇଁ **୧୦୦ Percentage Point** ରହିବ ।

ଉପାଂଶ-୧

ପ୍ରବନ୍ଧ ବାତାୟନ - ସଂପାଦନା - ଶରତ ଚନ୍ଦ୍ର କର।

ପାଠ୍ୟ ୧) ଗୁରୁ ଓ ଶିଷ୍ୟ- ଅଧ୍ୟାପକ ବିପିନ ବିହାରୀ ରାୟ୍ ।
୨) ଜନ୍ମଭୂମି-ଡ. କୃଷ୍ଣଚନ୍ଦ୍ର ପାଣିଗ୍ରାହୀ।
୩) ଭୁଲ-ଡଃ ଭୁବନେଶ୍ୱର ବେହେରା ।

ଉପାଂଶ-୨

କବିତାର ନୂଆ ମାନଚିତ୍ର- ସଂପାଦନା- ଦାଶରଥୀ ଦାସ ।

ପାଠ୍ୟ - ୧) ମୁଁ ହାଟ ବାହୁଡା-ଫକୀର ମୋହନ ସେନାପତି ।
୨) ବନ୍ଦୀର ଆତ୍ମକଥା-ଗୋପବନ୍ଧୁ ଦାଶ।
୩) ଆଗାମୀ - କାଳିନ୍ଦୀ ଚରଣ ପାଣିଗ୍ରାହୀ ।
୪) ଅପଥଗାମୀ - ରାଧାମୋହୋନ ଗଡନାୟକ।
୫) ଝଡ- ସଚ୍ଚିଦାନନ୍ଦ ରାଉତ୍‌ରାୟ୍।

(ଉପରୋକ୍ତ ଦୁଇଟି ଉପାଂଶରୁ ଦୀର୍ଘଉତ୍ତର ମୂଳକ ପ୍ରଶ୍ନ ଦିଆଯିବ । ସେହିପରି ଉଭୟ୍ ଉପାଂଶରୁ ଦୁଇଟି କରି ଚାରୋଟିର ସରଳାର୍ଥ ପ୍ରଶ୍ନ ଦିଆଯିବ।

ଉପାଂଶ-୩

ପ୍ରବନ୍ଧ ଲିଖନ।
(ସାହିତ୍ୟ- ବିଜ୍ଞାନ ଭିତ୍ତିକ ଚିନ୍ତାମୂଳକ ଓ ସମସ୍ୟା ଧର୍ମୀ)।

ଉପାଂଶ-୪

ଭ୍ରମ ସଂଶୋଧନ

କ) ଶବ୍ଦଗତ ଭ୍ରମ

ଖ) ବାକ୍ୟଗତ ଭ୍ରମ

M.I.L 101 M.I.L (Hindi) (2-0-0)

FIRST SEMESTER

There shall be one paper carrying 100 percentage point in the First Semester.

1. गद्यपाठ : श्रेष्ठ हिन्दी निबन्ध : सम्पादक - डॉ अजय कुमार पट्टनायक, शबनम पुस्तक महल, कटक।

   पाठ्य बिषयः ईर्ष्या : रामचन्द्र शुक्ल
   कुटज : हजारी प्रसाद द्विवेदी
   पर्वतपुत्र : महादेवी वर्मा

2. पद्यपाठ : काब्य सौरभ : सम्पादक : पुरुषोत्तम दास मोदी, विस्बविद्याळय प्रकाशन, वाराणासी।

   पाठ्य बिषय क) कबीर - साखियाँ----------1-10
   ख) सुरदास- बाल लीला : पद-3, बिनयपद : 4, 5
   ग) जय शंकर प्रसाद - बीती बिभाबरी
   घ) सुमित्रा नन्दन पंत - मौन निमन्त्रण
   ङ) महादेवी वर्मा : गीत संख्या -2
   (यह मन्दिर का दीप...)

3. ब्याकरण (लिंग, वचन, क्रिया, कारक, वाक्य, शब्द क्रम सम्बन्धी वाक्य शुद्धि)

4. संक्षेपण **(Précis Writing)**
   (A Passage about 150 words to be given for précis writing)

The division of the units for the examination will be as follows:

Unit-I
One long question from Prose.

Unit-II
One long question from Poetry.

Unit-III
a) Explanation from Prose
b) Explanation from Poetry.

Unit-IV
Grammar

Unit - V
Précis Writing

1. सन्दर्भ ग्रन्थ :

1. आधुनिक हिन्दी व्याकरण ओर रचना - वासुदेव नन्दन प्रसाद.
2. शुद्द हिन्दी : डॉ. हरदेव बाहरी

Semester I

PHYSICS-C I: MATHEMATICAL PHYSICS-I
(Credits: Theory-04, Practicals-02)
Theory: 53 Lectures
The emphasis of course is on applications in solving problems of interest to physicists.
The students are to be examined entirely on the basis of problems, seen and unseen.

Module 1 (18 lectures)

Calculus:
Approximation: Taylor and binomial series (statements only).First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral. **(12 Lectures)**

Vector Calculus:
Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. **(06 Lectures)**

Module 2 (20 lectures)

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities. **(8 Lectures)**

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs). **(12 Lectures)**

Module 3 (15 lectures)

Orthogonal Curvilinear Coordinates:
Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. **(6 Lectures)**

Introduction to probability:
Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance. Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing. **(6 Lectures)**

Dirac Delta function and its properties:
Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. **(3 Lectures)**

Reference Books:

- Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
- An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
- Differential Equations, George F. Simmons, 2007, McGraw Hill.
- Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
- Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book
- Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
- Mathematical Physics, Goswami, 1st edition, Cengage Learning
- Engineering Mathematics, S.Pal and S.C. Bhunia, 2015, Oxford University Press
- Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
- Essential Mathematical Methods, K.F.Riley & M.P.Hobson, 2011, Cambridge Univ. Press

PHYSICS LAB- C I LAB:

10 Labs

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- *Highlights the use of computational methods to solve physical problems*
- *The course will consist of lectures (both theory and practical) in the Lab*
- *Evaluation done not on the programming but on the basis of formulating the problem*
- *Aim at teaching students to construct the computational problem to be solved*
- *Students can use any one operating system Linux or Microsoft Windows*

Topics	**Description with Applications**
Introduction and Overview	Computer architecture and organization, memory and Input/output devices
Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflowemphasize the importance of making equations in terms of dimensionless variables, Iterative methods
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.

Review of C & C++ Programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (*If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops*), Arrays (*1D & 2D*) and strings, user defined functions, Structures and Unions, Idea of classes and objects
Programs:	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search
Random number generation	Area of circle, area of square, volume of sphere, value of pi (**π**)
Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving $\alpha = tan\alpha$; $I = I_0 \left(\frac{sin\alpha}{\alpha}\right)^2$ in optics
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. *sin θ, cos θ,tan θ, etc.*

Referred Books:

- Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
- Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw-Hill Pub.
- Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal, 3rd Edn. , 2007, Cambridge University Press.
- A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
- Elementary Numerical Analysis, K.E. Atkinson, 3 r d Edn. , 2007 , Wiley India Edition.
- Numerical Methods for Scientists & Engineers, R.W. Hamming, 1973, Courier Dover Pub.
- An Introduction to computational Physics, T.Pang, 2nd Edn. , 2006,Cambridge Univ. Press
- Computational Physics, Darren Walker, 1st Edn., 2015, Scientific International Pvt. Ltd.

PHYSICS-C II: MECHANICS
(Credits: Theory-04, Practicals-02)
Theory: 50 Lectures
Module I (15 lectures)

Overview of single particle dynamics: Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance. Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse.

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Force as gradient of potential energy. Work done by non-conservative forces. Law of conservation of Energy.

Collisions: Elastic and inelastic collisions between particles. Centre of Mass

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire

Module II (15 lectures)

Rotational Dynamics: Angular momentum of a particle and system of particles.Torque. Principle of conservation of angular momentum. Rotation about a fixed axis.Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation.

Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube.

Module III (20 lectures)

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere.

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits.

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values. Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor.

Reference Books:

1. Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
2. An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
3. Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
4. Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
5. Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.

PHYSICS LAB-C II LAB (Any 8 to be done)

1. To determine the value of g using Bar Pendulum.

2. To determine the Young's Modulus of a Wire by Searle's method.

3. To determine the Modulus of Rigidity of a Wire by static torsion method.

4. To determine the Moment of Inertia of a Flywheel.

5. To determine Coefficient of Viscosity of water by Capillary Flow *Method (Poiseuille's method).*

6. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.

7. To determine the height of a building using a Sextant.

8. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity.

9. To determine **g** and velocity for a freely falling body using Digital Timing Technique.

10. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.

Reference Books

- Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Laboratory Manual of Physics for undergraduate classes,D.P.Khandelwal,1985, Vani Pub.

Semester II

MSEN1201 (COMMUNICATIVE ENGLISH-I) (2-0-0)

SECOND SEMESTER

The paper in English is of 100 (Hundred) percentage marks.

MODULE-I: Communication Skill

Communication: Definition, concept

Channels of Communication: Sender, receiver, channel, message, encoding, decoding, context, feedback

Verbal & Non-Verbal Communication: Spoken & written-advantages & disadvantages

Bias free English,

Formal & informal style.

MODULE-II: Communicative Grammar

Time, Tense & Aspect

Verbs of state & events

Modality

Active & Passive voice

Antonyms, Synonyms, Homonyms, one word substitutions & correction of errors

MODULE-III: Sounds of English

Length of vowels:
Long vowels as in the words feel, food, shoot, card etc.
Short vowels as in the words pen, sun, cut, shut, etc.
Consonants
Stress pattern
Intonation: Rising & Falling.

Text Books:

Effective technical communication by M.A.Rizvi

Reference Books:

Communicative English & Business Communication by R.K.Panda, J.Khuntia, M.Pati, Alok Publication.

Communicative Grammar of English Geoffery Leech

MSES 1201 ENVIRONMENTAL STUDIES (3-1-0)

SECOND SEMESTER

Module-I

Concepts of Ecology & Environment: Definition-Environment, Ecology & Ecosystem; Environmental concepts – Atmosphere, Hydrosphere, Lithosphere & Biosphere, Environmental factors – Abiotic factors (Climate & Edaphic) & Biotic factors, Environmental gradients & limiting factor.

Concept of Ecosystem & Processes: Type & Structure, Ecosystem Processes – Energy flow, food chain, food web & ecological pyramids; Biogeochemical cycles – Hydrological cycle(water),

gaseous cycle(carbon & oxygen), sedimentary cycle(nitrogen & sulphur).

Module-II

Population ecology & Ecological succession:
Population ecology: Population density, natality, mortality, population age structure, population growth curves & carrying capacity.
Ecological succession: Characteristics, types (Hydrosere&Xerosere) & Process.
Environmental Pollution: Water pollution, Noise pollution, Air pollution(source, effect, control measure), Depletion of ozone layer – cause, effect & control measure, Green House Effects & Global warming, Acid rain, Biological concentration and biomagnifications, Sewage & sewage treatment.

Module-III

Conservation of natural resources: Natural resources – renewable, non-renewable, abstract resources, Biodiversity & its conservation, wild wife conservation, pollution control board, Environmental awareness & mass education.

Text Books:

1. Text book of Environmental studies by A.K.Panigrahy&A.Sahu, SadagranthaMandir Publishing, Berhampur.

Reference Books:

1. Fundamentals of Ecology by E.P.Odum
2. Environmental Engineering by G.Kiely
3. Fundamentals of Environmental studies by N.K.Tripathy
4. Environmental Biology by P.D.Sharma
5. Ecology & Environment by P.D.Sharma
6. Principles of Environmental Engineering & Science by Davis &Masten

PHYSICS-C III: THERMAL PHYSICS
(Credits: Theory-04, Practicals-02)
Theory: 50 Lectures

(*Include related problems for each topic*)

Module I (15 lectures)

Introduction to Thermodynamics:

Zeroth and First Law of Thermodynamics: Extensive and intensive ThermodynamicVariables, Thermodynamic Equilibrium, Zeroth Law of Thermodynamics & Concept of Temperature, Concept of Work & Heat, State Functions, First Law of Thermodynamics and its differential form, Work and Internal Energy in different processes. Applications of first law.

Second Law of Thermodynamics: Reversible and Irreversible process with

examples. Conversion of Work into Heat and Heat into Work. Heat Engines. Carnot's Cycle, Carnot engine & efficiency.Carnot's Theorem. Refrigerator & coefficient of performance, 2nd Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their Equivalence. Applications of Second Law of thermodynamics. Absolute scale of temperature.

Module II(15 lectures)

Entropy: Concept of Entropy, Second Law of Thermodynamics in terms of Entropy. Entropy of a perfect gas. Principle of Increase of Entropy. Entropy Changes in Reversible and Irreversible processes with examples. Entropy of the Universe. Temperature–Entropy diagrams for Carnot's Cycle.
Third Law of Thermodynamics. Unattainability of Absolute Zero.
Thermodynamic Potentials: Thermodynamic Potentials: Internal Energy, Enthalpy, Helmholtz Free Energy, And Gibb's Free Energy. Their Definitions, Properties and Applications. Cooling due to adiabatic demagnetization, Clausius Clapeyron Equation.
Maxwell's Thermodynamic Relations and applications

Module III (20 lectures)
Kinetic Theory of Gases
Distribution of Velocities: Maxwell-Boltzmann Law of Distribution of Velocities in an Ideal Gas. Mean, RMS and Most Probable Speeds. Degrees of Freedom. Law of Equipartition of Energy (No proof required). Specific heats of Gases.
Molecular Collisions: Mean Free Path. Collision Probability. Estimates of Mean Free Path. Transport Phenomenon in Ideal Gases: (1) Viscosity, (2) Thermal Conductivity and (3) Diffusion. Brownian Motion and its Significance.
Real Gases: Behaviour of Real Gases. Van der Waal's Equation of State for Real Gases. Values of Critical Constants. Comparison with Experimental Curves. P-V Diagrams. Joule's Experiment. Free Adiabatic Expansion of a Perfect Gas. Joule-Thomson Porous Plug Experiment. Joule- Thomson Effect for Real and Van der Waal Gases. Temperature of Inversion. Joule- Thomson Cooling.

Reference Books:

1. Heat and Thermodynamics, M.W. Zemansky, Richard Dittman, 1981, McGraw-Hill.
2. A Treatise on Heat, MeghnadSaha, and B.N.Srivastava, 1958, Indian Press
3. Thermal Physics, S. Garg, R. Bansal and Ghosh, 2nd Edition, 1993, Tata McGraw-Hill
4. Modern Thermodynamics with Statistical Mechanics, Carl S. Helrich, 2009,

Springer.
5. Thermodynamics, Kinetic Theory & Statistical Thermodynamics, Sears & Salinger 1988, Narosa.
6. Concepts in Thermal Physics, S.J. Blundell and K.M. Blundell, 2nd Ed., 2012, Oxford University Press.
7. Thermal Physics, A. Kumar and S.P. Taneja, 2014, R. Chand Publications.

PHYSICS LAB- C III LAB (Any 6 to be done)

1. To determine the Coefficient of Thermal Conductivity of a bad conductor by Lee's method.
2. To determine Mechanical Equivalent of Heat, J, by Joule's calorimeter.
3. To study the variation of Thermo-Emf of a Thermocouple with Difference of temperature of its Two Junctions.
4. To determination of radiation correction of ice by joule's calorimeter.
5. To determine Mechanical Equivalent of Heat, J, by Callender and Barne's constant flow method.
6. To determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus.
7. To determine the Coefficient of Thermal Conductivity of Cu by Angstrom's Method.
8. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
9. To calibrate a thermocouple to measure temperature in a specified Range using (1) Null Method, (2) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature.

Reference Books

1) Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, AsiaPublishing House.
2) A Text Book of Practical Physics, I.Prakash& Ramakrishna, 11th Ed., 2011, KitabMahal.
3) Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition,reprinted 1985, Heinemann Educational Publishers.
4) A Laboratory Manual of Physics for undergraduate classes,D.P.Khandelwal,1985, Vani Pub.

PHYSICS-C IV: WAVES AND OPTICS
(Credits: Theory-04, Practicals-02)
Theory: 54 Lectures

Module 1 (15 lectures)

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and(2) different frequencies (Beats). **(4 Lectures)**

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves.PlaneProgressive (Travelling) Waves.Wave Equation.Particle and Wave Velocities.Differential Equation.Pressure of a Longitudinal Wave.Energy Transport.Intensity ofWave. Water Waves: Ripple and Gravity Waves. **(5 Lectures)**

Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity ofLongitudinal Waves in a Fluid in a Pipe.Newton's Formula for Velocity of Sound.Laplace's Correction.**(6 Lectures)**

Module 2 (22 lectures)

Superposition of Two Harmonic Waves: Standing (Stationary) Waves in a String:Fixed and Free Ends. Analytical Treatment.Phase and Group Velocities.Changes withrespect to Position and Time.Energy of Vibrating String.Transfer of Energy.NormalModes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment.Longitudinal Standing Waves and Normal Modes.Open and Closed Pipes.Superposition of N Harmonic Waves.**(7 Lectures)**

Wave Optics
Interference.Huygens Principle.Division of amplitude and wavefront. Young's double slit experiment.Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment.Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination(Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings:Measurement of wavelength and refractive index. **(9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) RefractiveIndex, and (5) Visibility of Fringes. Fabry-Perot interferometer.**(6 Lectures)**

Module 3 (17 lectures)

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope.Double slit. Multiple slits. Diffraction grating.Resolving power of grating.**(8 Lectures)**

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for PlaneWave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate:

MultipleFoci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, aslit and a wire.**(9 Lectures)**

Reference Books

 Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
 Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
 Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
 Optics, AjoyGhatak, 2008, Tata McGraw Hill
 The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
 The Physics of Waves and Oscillations, N.K. Bajaj, 1998, Tata McGraw Hill.
 Fundamental of Optics, A. Kumar, H.R. Gulati and D.R. Khanna, 2011, R. Chand Publications.

PHYSICS LAB- C IV LAB
10 Lab classes (Any 6 to be done)

1. To determine wavelength of sodium light using Newton's Rings.
2. To determine wavelength of Na source using plane diffraction grating.
3. To investigate the motion of coupled oscillators.
4. To study Lissajous Figures.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of a prism using mercury source.
7. To determine the wavelength of sodium source using Michelson's interferometer.
8. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books

 Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
 A Text Book of Practical Physics, I. Prakash& Ramakrishna, 11th Ed., 2011, KitabMahal
 Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition,reprinted 1985, Heinemann Educational Publishers
 A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.

Other semesters syllabus is under preparation