# TEACHING PLAN (SYNOPSIS)

Month : August  Subject : physics

TOPIC : Vector Analysis  Paper : I

| | |
|---|---|
| Hours Required | 18 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Telugu academi, Vikek |
| Topic Synopsis | Vector Analysis. |

UNIT- I

Vector Analysis :-

i) Scalar and vector fields.

ii) Gradient of a scalar field physical significance.

iii) Divergence and curl of a vector field with derivations and physical interpretation.

iv) vector integration.

v) Gauss theorem.

vi) Stoke's theorem.

vii) Scalar fields and vector fields.

| | |
|---|---|
| Thrust areas | |
| Skill to be learnt by Student | |
| Examples/Illustrations | |
| Additional Inputs | |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Black Boards, |
| References cited | |
| Student Activity planned after the teaching | assignments. |
| Activity planned outside classes | Group discussions |
| Any other | |

Principal

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Incharge

Y. Atharva
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : ~~September~~ August/September  Subject : physics

TOPIC : Abberations / Interference  Paper : III

| | |
|---|---|
| Hours Required | 18 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Vivek, Telugu Academy, Unified physics |
| Topic Synopsis | Aberations |

i) chromatic aberations

ii) Achromatism.

iii) Spherical aberration.

iv) Minimisation of Spherical aberation.

v) coma, astigmatism.

vi) Achromatism for two lenses.
(a) contact (b) Separated.

INTERFERENCE :-

viii) principle of Superposition.
(a) coherence.

viii) Fresnel's biprism.

ix) Oblique incidence of a plane wave.
[cosine law].

(x) Newton's rings.

| | |
|---|---|
| Thrust areas | |
| Skill to be learnt by Student | |
| Examples/Illustrations | |
| Additional Inputs | |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Black Board |
| References cited | |
| Student Activity planned after the teaching | Seminars |
| Activity planned outside classes | Group discussions |
| Any other | |

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Y. Ashasree
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : September Subject : physics

TOPIC : Mechanics of particles/bodies, Paper : I

| | |
|---|---|
| Hours Required | 90 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Unified physics, Vivek |
| Topic Synopsis | Mechanics of particles. |

i. Laws of Motion.

ii. Motion of Variable Mass system

iii. Collisions in two and three dimensions.

iv. Impact parameter. Scattering cross section.

v. Rutherford Scattering derivation.

Mechanics of Rigid bodies :-

vi. Equation of motion for a rotating body.

vii. Angular Momentum

viii. Euler Equation & applications.

(ix) Gyroscope, Equinoxes.

(x) Elastic constant of isotropic solids & relations

xi. poisson's ratio, p.r in terms $Y, \eta, K$

xii. Classification of beams, Loads.

xiii. Shearing force and bending moment.

| | |
|---|---|
| Thrust areas | |
| Skill to be learnt by Student | |
| Examples/Illustrations | |
| Additional Inputs | |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Black Board |
| References cited | |
| Student Activity planned after the teaching | Seminar |
| Activity planned outside classes | Group discussions. |
| Any other | |

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Y. Athchee
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : September  Subject : physics

TOPIC : Diffraction  Paper : III

| | |
|---|---|
| Hours Required | 21 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | Diffraction. |

Diffraction :-

i. Distinction between fresnel and Frounhoffer
ii. Frounhoffer diffraction - Single, double slits
iii. Diffraction grating
iv. Resolving power of grating
v. Wavelength of light in normal incidence. & minimum deviation Methods.
vi. Fresnel's half period zones.
vii. half period zones, zone plate
viii. Comparing of zone plate with convex lens
viii. Difference between interference and diffraction.
ix. polarization [Malus Law, Brewster's Law].
x. Double refraction
xi. Nicol prism.
xi. Interference, Babinets compensator.
xii. Wave plates, Laurent half-shade polarimeter.

| | |
|---|---|
| Thrust areas | |
| Skill to be learnt by Student | |
| Examples/Illustrations | |
| Additional Inputs | |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Blackboard |
| References cited | |
| Student Activity planned after the teaching | Seminars. |
| Activity planned outside classes | Group discussions |
| Any other | |

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# TEACHING PLAN (SYNOPSIS)

Month : October Subject : physics

TOPIC : Holography - F.O Paper : III

| | |
|---|---|
| Hours Required | 20 |
| Learning Objectives | To improve the skills |
| Previous Knowledge to be reminded | V.vek, |
| Topic Synopsis | |

Lasers and holography.

Spontaneous & Stimulated emission

Laser principle., Einstein coefficients

Types of Lasers,

Ruby, He-Ne Laser. & Applications

properties, of Laser.

Holography

principle,

Applications of Holography.

Holography different from photography

Fibre optics

Introduction,

Advantages & applications of O.F.

Types of O.F.

Fibre communications.

problems

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | Studis & about a topic Examples. |
| Examples/Illustrations | about light Some Examples. |
| Additional Inputs | about Some light techniques |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black Board |
| References cited | Telugu academy. |
| Student Activity planned after the teaching | Seminars / project |
| Activity planned outside classes | Group discussion. |
| Any other | - |

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# TEACHING PLAN (SYNOPSIS)

Month : October Subject : physics

TOPIC : Central forces - relativity. Paper : I

| | |
|---|---|
| Hours Required | 20 |
| Learning Objectives | To improve skills about the topics |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | central forces. |

central forces :

i. central forces.
ii. characteristics of central forces.
iii. Negative gradient of potential
iv. Kepler's Law.
v. Motion of Satellites.
vi. Global positioning system (Gps).

Special theory of Relativity :

i. Galilean relativity.
ii. Michelson - Morley Experiment.
iii. Lorentz transformation.
iv. time dilation, length contraction.
v. Mass Energy relation.
vi. addition of velocities.

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | Studies & Experiments about particular topic. |
| Examples/Illustrations | Examples |
| Additional Inputs | - |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black Board |
| References cited | Telugu Academy |
| Student Activity planned after the teaching | Seminars |
| Activity planned outside classes | Project |
| Any other | - |

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# TEACHING PLAN (SYNOPSIS)

Month : December Subject : Physics

TOPIC : Kinetic theory of gases Paper : III

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | To develop the skills |
| Previous Knowledge to be reminded | Level |
| Topic Synopsis | Thermodynamics |

I) Kinetic theory of gases.

(1) Maxwell's laws of distribution & Molecular speed

(2) Transport phenomena

(3) Mean free path

(4) Viscosity of gases, thermal conductivity

(5) diffusion of gases.

II) Thermodynamics:

(1) Isothermal and adiabatic process.

(2) Reversible and irreversible process

(3) Carnot's Engine & efficiency & theorem.

(4) Second Law of thermodynamics,

(5) Kelvin & clausis statements — entropy

(6) Entropy in reversible & irreversible procss

(7) Entropy and disorder.

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | Thermodynamics & and about heat |
| Examples/Illustrations | Examples related to the Experimen |
| Additional Inputs | About Heat Something added and |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard & chalk |
| References cited | Telugu Academy |
| Student Activity planned after the teaching | Seminar |
| Activity planned outside classes | — |
| Any other | — |

for P. Tilluvari
Principal

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V. Ashok
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : December Subject : physics

TOPIC : Simple harmonic oscillation Paper : II

| | |
|---|---|
| Hours Required | 24 |
| Learning Objectives | To understand about S.H.O. |
| Previous Knowledge to be reminded | Vivek, telugu academy. |
| Topic Synopsis | — |

Simple Harmonic oscillators-

→ Simple harmonic oscillator
→ Solution of the differential equations
→ Torsional pendulum
Compound pendulum.
Super position
→ Two mutually perpendicular S.H.V of same & different frequencies

Lissajous figures.

Damped and forced oscillations:

→ Sol$^n$ of the different equation of damped oscillat
→ Energy considerations.
→ Logarithmic decrement.
→ relaxation time, quality factor.
→ Amplitude & Velocity resonance
→ Differential eq$^n$ of forced oscillator.

Complex vibrations:

Fourier theorem

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | About oscillations how much gravity it takes |
| Examples/Illustrations | Examples about oscillations. |
| Additional Inputs | Experiments. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard |
| References cited | Vivek / Telugu Academy |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | - |
| Any other | |

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For PRINCIPAL
Principal
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Y. Ashok
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : January Subject : Physics

TOPIC : Thermodynamics Paper : IV

| | |
|---|---|
| Hours Required | 15 |
| Learning Objectives | To understand about Fluids. |
| Previous Knowledge to be reminded | Vivek. Telugu academy. |
| Topic Synopsis | Thermodynamics |

→ Entropy of universe – Temperature entropy.
(T-S) diagram and its uses.
change of entropy
3rd Law of thermodynamics.

Thermodynamics potentials and Maxwell's eq'ns.
→ Thermodynamic potentials
→ Maxwells relations
→ Clausis - clayperson's Equation
→ Ratio of Specific heats
→ Joule Kelvin Effect
→ Joule Kelvin coefficient
→ To Vanderwall's eq'n

L.T.P

Joule – Kelvin Effect

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | About Maxwells relations |
| Examples/Illustrations | relations about Maxwells |
| Additional Inputs | - |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black Board |
| References cited | Telugu Academy. |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | - |
| Any other | - |

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Principal
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Lecturer.

# TEACHING PLAN (SYNOPSIS)

Month : January. Subject : physics

TOPIC : Ultrasonics- Paper : II

| | |
|---|---|
| Hours Required | 15 |
| Learning Objectives | To improve skills about Sound. |
| Previous Knowledge to be reminded | Vivek Academy |
| Topic Synopsis | |

→ Square wave.

→ fourier coefficients

Ultrasonics:

properties of ultrasonic waves.

production of ultrasonic by.

i) piezo Electric Method.

ii) Magnetostriction method.

iii) detection of ultrasonics.

Applications of ultrasonic waves.

Sonar

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | Some Methods about Sound. |
| Examples/Illustrations | Examples with Experimental theories |
| Additional Inputs | Experiments. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard. |
| References cited | Vivek, Telugu Academy. |
| Student Activity planned after the teaching | Projects / Assignments. |
| Activity planned outside classes | – |
| Any other | – |

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Principal
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Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : February Subject : physics

TOPIC : Low temperature physics Paper : IV

| | |
|---|---|
| Hours Required | 24 |
| Learning Objectives | To develop this subject |
| Previous Knowledge to be reminded | Vivek |
| Topic Synopsis | Unit-IV |

Low temperature physics:

1) First order phase transition
2) Joule - Thomson cooling
3) Joule - Kelvin effect
4) Adiabatic Expansion.
5) Liquefaction of Air - Lindes apparatus.
6) Helium - Kapitza's method.
7) Helium liquid I & II
8) Adiabatic demagnetization / Low temperature
9) refrigeration
10) elctro - fluro carbons on ozone layer.
11) Applications of low temperature physics.

| | |
|---|---|
| Thrust areas | – |
| Skill to be learnt by Student | Cooling - heating effects. |
| Examples/Illustrations | With Examples |
| Additional Inputs | – |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black board. |
| References cited | Telugu Akademy |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | — |
| Any other | — |

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for Principal
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# TEACHING PLAN (SYNOPSIS)

Month : February  Subject : physics

TOPIC :  Paper : II

| | |
|---|---|
| Hours Required | 2h |
| Learning Objectives | About vibrations & improve skills |
| Previous Knowledge to be reminded | Vivek Academy. |
| Topic Synopsis | Vibrating strings. |

Introduction

1) Normal Modes of wave motion.
2) transverse wave propagation along a stretched string -
3) General Solution of wave equation -
4) Energy density.
5) Transverse impedance
6) Energy transport
7) Laws of vibrations of strings along transverse.

| | |
|---|---|
| Thrust areas | |
| Skill to be learnt by Student | |
| Examples/Illustrations | |
| Additional Inputs | |

| | |
|---|---|
| Teaching Models used | Lecture. |
| Teaching Aids used | Black board, chalk. |
| References cited | Telugu Academy. |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | - |
| Any other | - |

For Principal

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# TEACHING PLAN (SYNOPSIS)

Month : March. Subject : physics

TOPIC : Thermal radiation Paper : IV

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | To improve skills. |
| Previous Knowledge to be reminded | Work, Academy. |
| Topic Synopsis | Thermal radiation |

i. Properties of thermal radiation
ii. Black body radiation
iii. Laws of thermal radiation
iv. B.B.R Experimental findings.
v. Rayleigh Jean's law.
vi. Weins displacement law.
vii. Planck's law of distribution formula
viii. Solar constant
ix. Perry's total radiation pyrometer.

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | Capacities of Heat & thois radiation |
| Examples/Illustrations | - |
| Additional Inputs | Examples given in T.B |

| | |
|---|---|
| Teaching Models used | Lecture. |
| Teaching Aids used | Black board, Chalk. |
| References cited | Academy. |
| Student Activity planned after the teaching | Project works / |
| Activity planned outside classes | Assignments. |
| Any other | — |

for P.T. Kumari
Principal
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Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : March. Subject : physics.

TOPIC : Vibration of bars. Paper : II.

| | |
|---|---|
| Hours Required | 18 |
| Learning Objectives | To improve skills |
| Previous Knowledge to be reminded | Viva, Academy. |
| Topic Synopsis | Bars of vibrations. |

i. Vibrations of bars.
ii. Longitudinal vibrations of bars.
iii. Longitudinal strain
iv. Wave Eq'n of bar.
v. Bar fixed at both ends
vi. Free Ends.
vii. Transverse vibrations of bar
viii. plancks Laws of distribution formula
ix. Uniform Bar.
x. Bar clamped at one end and free end.
xi. Bar free at both Ends.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | about Bars and their vibrations |
| Examples/Illustrations | Examples. |
| Additional Inputs | — |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black board & chalk. |
| References cited | Academy. Vivek. |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | — |
| Any other | — |

For P.T. Kumar,
Principal

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Incharge

Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : July. Subject : physics.

TOPIC : Mechanics & properties of matter Paper : I.

| | |
|---|---|
| Hours Required | 25 |
| Learning Objectives | To learn about Vector Analysis |
| Previous Knowledge to be reminded | Telugu Academy, Vivek, Unified Physics. |
| Topic Synopsis | Vector Analysis |

UNIT- I.

1) Scalar and Vector fields.
2) Gradient of a scalar field. & Significance
3) Divergence & curl of a V.f.
4) Vector integration
5) Gauss theorem.
6) Stoke's theorem.
7) Scalar fields & Vector fields.

UNIT-II

1) Laws of Motion.
2) Motion of Variable Mass system.
3) equation of Motion of rocket.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | About Vector fields. |
| Examples/Illustrations | Some Experiments & text content. |
| Additional Inputs | Some other with are related to V.fields. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard & Chalk |
| References cited | Telugu Academy. |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | – |
| Any other | – |

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Government Degree College
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Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : July

Subject : physics

TOPIC : Wave optics

Paper : III

| | |
|---|---|
| Hours Required | 25 |
| Learning Objectives | optics – about |
| Previous Knowledge to be reminded | Telugu Academy, Vivek |
| Topic Synopsis | Abberations / interference |

UNIT - I

(1) Chromatic aberration.
(2) Achromatism.
(3) spherical aberration.
(4) coma.
(5) Astigmation
(6) curvature / distortion.

UNIT- II

(1) coherence, Superposition.
(2) Interference.
(3) Fresnel's Biprism.
(4) Lloyd's Mirror Method.
(5) Normal incidence.
(6) cosine law, cosine law,
(7) colours of thin films.
(8) Newton's rings - Experiment.
(9) Wavelength of Monochromatic light
(10) Michelson interferometer.

| | |
|---|---|
| Thrust areas | – |
| Skill to be learnt by Student | About day which are occurring |
| Examples/Illustrations | Minimizing & text Examples. |
| Additional Inputs | other Examples in academy books |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black board |
| References cited | Telugu academy. |
| Student Activity planned after the teaching | assignments. |
| Activity planned outside classes | — |
| Any other | — |

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# TEACHING PLAN (SYNOPSIS)

Month : July

Subject : physics

TOPIC : Magnetism & Electronics

Paper : V (A)

| | |
|---|---|
| Hours Required | 25 |
| Learning Objectives | Electricity |
| Previous Knowledge to be reminded | electric field intensity |
| Topic Synopsis | Electrostatics |

UNIT-I

1. Gauss's law.
2. Electric potential
3. Equi potential surfaces
4. Charged spherical shell.
5. Uniformly charged sphere.

Dielectrics.

i. Electric dipole moment.
ii. D, E, P relations.
iii. Susceptibility.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | about potentials & intensity |
| Examples/Illustrations | about attraction. Some Examples |
| Additional Inputs | referred text books & giving knowledge. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard - chalk |
| References cited | Unified physics. |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | — |
| Any other | — |

for P.T.Kumari
Principal

Incharge

Y.A...
Lecturer

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# TEACHING PLAN (SYNOPSIS)

Month : July

Subject : Physics.

TOPIC : Modern physics.

Paper : V (B).

| | |
|---|---|
| Hours Required | 25 |
| Learning Objectives | Atomic physics. |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | Modern physics - |

UNIT - I

(1) Atomic & Molecular physics.
(2) Bohr's atomic Model.
(3) Sommerfield's elliptical orbits.
(4) Vector atom Model.
(5) quantum numbers.
(6) L-S, j-j coupling.
(7) Zeeman effect.
(8) Stokes, anti stokes.
(9) Raman effect.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | Learning about modern technologies. |
| Examples/Illustrations | related to Experiments |
| Additional Inputs | With references of text content. |

| | |
|---|---|
| Teaching Models used | Lecture. |
| Teaching Aids used | Black board. |
| References cited | Telugu Academy |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | — |
| Any other | — |

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P. T. Kumar,
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Incharge

Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : August

Subject : physics.

Paper : I.

TOPIC :

| | |
|---|---|
| Hours Required | 24 |
| Learning Objectives | To be learnt about Equations. |
| Previous Knowledge to be reminded | — Work, |
| Topic Synopsis | Mechanics of Rigid bodies. |

(1) Conservation of Energy and Momentum.
(2) Collision in two and three dimensions.
(3) impact parameter.
(4) Scattering cross-section.
(5) Rutherford scattering - derivation.

UNIT - II

(6) Euler Equation
(7) Gyroscope.
(8) Equinoxes.
(9) Y, n, k relations.
(10) isotropic solids.
(11) poisson's ratio
(12) beams, Loads.
(13) shearing force & bending moment.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | They Learnt some Experiments & their working |
| Examples/Illustrations | Yes. |
| Additional Inputs | related to topic other academic. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black board. |
| References cited | Telugu Academy. |
| Student Activity planned after the teaching | Assignments, Projects |
| Activity planned outside classes | — |
| Any other | — |

P. T. Kumari
for Principal
PRINCIPAL
Government Degree College
SEETHANAGARAM-533 287
E.G.Dt., (A.P.)

Incharge

Y. Ade
Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : August
Subject : physics
TOPIC : Wave optics.
Paper : III

| | |
|---|---|
| Hours Required | 21 |
| Learning Objectives | Diffracting waves. |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | Diffraction / interference |

i. Colours of thin films.
ii. Non-reflecting films.
iii. Newtons rings - with / without

Diffraction

i. Fresnel & Fraunhofer diffraction.
ii. Fraunhofer diffraction due to single slit.
iii. Circular aperture
iv. Normal incidence.
v. N-slits. Fraunhoffer diffraction.
vi. Huygens - Fresnel theory.
vii. Fresnel's half zone plate
viii. Kirchoff formula.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | About slits & rings |
| Examples/Illustrations | Examples. |
| Additional Inputs | Other text books. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard & Chalk. |
| References cited | Telugu academy. |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | — |
| Any other | — |

P. T. Kumari

for Principal

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Incharge

Lecturer

# TEACHING PLAN (SYNOPSIS)

Month : August Subject : physics

TOPIC : Electric & Magnetic fields. Paper : II (a)

| | |
|---|---|
| Hours Required | 26 |
| Learning Objectives | - |
| Previous Knowledge to be reminded | Telugu Academy, Vivek. |
| Topic Synopsis | Electric & Magnetic Fields |

UNIT - II

1) Biot - Savart's Law.
2) Calculation of B due to long straight wire.
3) circular current loop and solenoid.
4) Lorentz force.
5) Hall effect.
6) Faraday's Law
7) Lenz's Law
8) Mutual inductance.
9) Self inductance.

UNIT-III

1) Alternating current - L-R, C-R circuit.
2) Vector diagrams,
3) LCR Series & parallel resonant.
4) Q-factor, power in ac circuits

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | Some knowledge about particular topics |
| Examples/Illustrations | Examples. |
| Additional Inputs | Academy books |

| | |
|---|---|
| Teaching Models used | Lecture. |
| Teaching Aids used | Black board. |
| References cited | Telugu academy |
| Student Activity planned after the teaching | Assignments. |
| Activity planned outside classes | — |
| Any other | — |

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Incharge

Lecturer

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A.P.

# TEACHING PLAN (SYNOPSIS)

Month : August

Subject : physics

Paper : II (B).

TOPIC :

| | |
|---|---|
| Hours Required | 24 |
| Learning Objectives | about Modern physics |
| Previous Knowledge to be reminded | Telugu academy. |
| Topic Synopsis | Matter waves. |

UNIT- II

1) Matter Waves.
2) de-broglie's hypothesis
3) Davisson and Germer Experiments
4) phase & group velocity
5) Heisenberg's uncertainity priciple.
6) Bohr.
7) Unit - III → Quantum (Wave) Mechanics.
Schrodinger time independant & time dependent.
2) physical interpretation of wave function
3) Eigen function, Eigen values
4) Application of schrodinger wave Eq'n
5) Liquid drop Model & Shell Model

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | about matter waves |
| Examples/Illustrations | Examples. |
| Additional Inputs | — |

| | |
|---|---|
| eaching Models used | Lecture. |
| eaching Aids used | Blackboard, chalk. |
| eferences cited | Academy books. |
| tudent Activity planned fter the teaching | Assignments. |
| ctivity planned outside asses | — |
| Any other | — |

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For Principal

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# TEACHING PLAN (SYNOPSIS)

Month : September. Subject : physics.

Paper : I.

TOPIC :

| | |
|---|---|
| Hours Required | 22 |
| Learning Objectives | To learn about the Laws of motion |
| Previous Knowledge to be reminded | Telugu Academy, Vivek. |
| Topic Synopsis | central force & Specific theory of relativity. |

UNIT- IV

1) Central forces & characteristics.
2) conservative nature & -ve gradient.
3) Kepler's Laws of motion
4) Motion of Satellites.
5) GPS (Global positioning system).

UNIT- V

1) Michelson - Morley Experiment
2) Specific theory of relativity.
3) Lorentz transformation.
4) Length contraction
5) Time dilation.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | about motions & Experiments. |
| Examples/Illustrations | Examples related to the Experimental |
| Additional Inputs | refered the other academy & Explain |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard & chalk |
| References cited | Telugu Academy. |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | |
| Any other | |

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# TEACHING PLAN (SYNOPSIS)

Month : September
Subject : Physics
TOPIC : Wave optics
Paper : III

| | |
|---|---|
| Hours Required | |
| Learning Objectives | Laser :- |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | polarization & Lasers. |

UNIT-IV

1) Malus Law
2) Brewster's Law.
3) Nicol prism.
4) Double refraction.
5) Quarter / half wave plate.
6) Babinet's Compensator.
7) Laurent's half-shade polarimeter.

UNIT-V

1) He-Ne Laser.
2) Ruby Laser.
3) Einstein coefficients.

| | |
|---|---|
| Thrust areas | - |
| Skill to be learnt by Student | They learnt about ~~Working~~ of Lasers & Refractions |
| Examples/Illustrations | Related to Text. |
| Additional Inputs | Reference books Examples. |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Black board & chalk. |
| References cited | Vivek & Academy. |
| Student Activity planned after the teaching | projects |
| Activity planned outside classes | — |
| Any other | — |

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# TEACHING PLAN (SYNOPSIS)

Month : September

Subject : physics.

TOPIC : Electricity

Paper : I (CA).

| | |
|---|---|
| Hours Required | |
| Learning Objectives | — |
| Previous Knowledge to be reminded | Telugu Academy, Vivek. |
| Topic Synopsis | Basic Electronics, Digital Electronics. |

UNIT - IV

Maxwell's Equations (integral and differential forms).
Maxwell's Wave Equation
poynting theorem.
Hertz Experiment

Basic electronics :-

PN Junction diode, Zener diode.
PNP - NPN transistors.
CB, CE and CC
β, ε & - transistor.

UNIT - V

Number System.
Laws of Boolean algebra.
De-Morgan's laws.
Basic logic gates
Half-adder & full adder.

| | |
|---|---|
| Thrust areas | — |
| Skill to be learnt by Student | about gates & binary. |
| Examples/Illustrations | — |
| Additional Inputs | Academy books |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard |
| References cited | Vivek & Telugu academy. |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | – |
| Any other | – |

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# TEACHING PLAN (SYNOPSIS)

Month : September

Subject : physics

TOPIC : Modern physics.

Paper : V (B.Sc)

| | |
|---|---|
| Hours Required | – |
| Learning Objectives | – |
| Previous Knowledge to be reminded | Vivek. |
| Topic Synopsis | Radioactivity decay. |

UNIT-IV

* basics $\alpha$-decay processes
  Gamow's theory
  Geiger Nuttal law.
  neutrino hypothesis.

UNIT-V

* Amorphous & Crystalline Materials.
  Unit cell & Miller indices.
  diffraction of x-rays.
  Bragg's Law.
  Laues Method & powder diffraction.
* Meissner effect.
  Type I – Type II Superconductors.
  Bcs theory.
  applications of Superconductors.

| | |
|---|---|
| Thrust areas | – |
| Skill to be learnt by Student | Learnt about indices |
| Examples/Illustrations | Examples |
| Additional Inputs | Academy books |

| | |
|---|---|
| Teaching Models used | Lecture |
| Teaching Aids used | Blackboard, chalk. |
| References cited | Vivek. other References. |
| Student Activity planned after the teaching | Assignments |
| Activity planned outside classes | - |
| Any other | - |

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# TEACHING PLAN (SYNOPSIS)

Month : ~~October~~ November 2022 Subject : physics

TOPIC : Thermodynamics. Paper : II

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Heat, Temperature |
| Topic Synopsis | |

Kinetic Theory of gases :-

Maxwells law of distribution of velocities -

$$dn_c = 4\pi n \left[\frac{m}{2\pi KT}\right]^{3/2} e^{-mc^2/2KT} c^2 dc$$

$m$ → mass of each gas molecule

$K$ — Boltzmann const.

$T$ — absolute Temp.

Degrees of freedom.

Mean free path.

Transport phenomena in ideal gases

~~viscosity~~, ~~thermal conductivity~~ viscosity

$$\eta = \frac{m\bar{c}}{3\sqrt{2}\pi d^2}$$

Thermal conductivity $K = \frac{1}{3}\rho \bar{c} C_v \lambda$

$$= \frac{1}{3\sqrt{2}} \frac{m\bar{c}C_p}{\pi d^2}$$

$$\frac{K}{\eta} = C_p$$

| | |
|---|---|
| Thrust areas | Reference books |
| Skill to be learnt by Student | motion of gas molecules at high temp |
| Examples/Illustrations | Boiled water, |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Brijlal & Subrahmanyam |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Diffusion coefficient - $D \propto T^{3/2} p^{-1}$

$\eta$ is independent of pressure or density

$\bar{c} \propto \sqrt{T}$ depends on sq. root of abs. Temp

$\eta \propto m$. mass.

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# TEACHING PLAN (SYNOPSIS)

Month : october  Subject : physics

TOPIC : mechanics  Paper : I

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Basics of momentum P.KE, P.E Newtons laws |
| Topic Synopsis | |

Mechanics of particles:

Newtons laws of motion.

motion of Variable mass system

motion of Rocket

multistage rocket

Impact parameter, Scattering cross section.

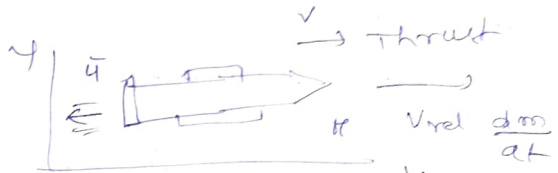
Rutherford scattering formula

$_2He^4$ $\alpha$ particle

Nucleus.

| | |
|---|---|
| ust areas | Standard books |
| to be learnt by dent | motion of rocket |
| nples/Illustrations | newtons laws |
| tional Inputs | model of jet propulsion system |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | P.O.P by DS Madhur |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |




$$V = V_0 + u \log_e \frac{M_0}{M} - gt$$

$$\sigma = \frac{Z^2 e^4}{16 \pi^2 \varepsilon_0^2 m^2 v_0^4 \sin^4 \theta/2}$$

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# TEACHING PLAN (SYNOPSIS)

onth : November  Subject : physics

PIC : mechanics of Rigid bodies  Paper : I

| | |
|---|---|
| ours Required | |
| earning Objectives | |
| evious Knowledge to be minded | moment of Inertia |
| pic Synopsis | |

Rigid body

Rotational kinematics

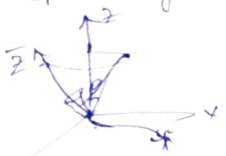
Eqn of motion for a rotating body $\frac{dL}{dt} = T$

Angular momentum $\frac{1}{2}\frac{d}{dt}[L^2] = 0$ $\Rightarrow$ L is constant

Moment of Inertia tensor

$$\overleftrightarrow{I} = \begin{vmatrix} I_{xx} & I_{xy} & I_{xz} \\ I_{yx} & I_{yy} & I_{yz} \\ I_{zx} & I_{zy} & I_{zz} \end{vmatrix} = \begin{bmatrix} I_{xx} & 0 & 0 \\ 0 & I_{yy} & 0 \\ 0 & 0 & I_{zz} \end{bmatrix}$$

Spinning Top




$$T = \vec{\omega}_p \times L$$

Gyroscope.

precession of Top.

| | |
|---|---|
| | Standard books from library |
| rnt by | Dynamics of Rigid bodies in various coordinates |
| trations | Top |
| ts | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | P.D.T by D.S Tadhur |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

$$\vec{T} = \vec{r} \times \vec{F}$$

Keplers laws

1. law of orbits
2. Areal vel is const
3. $T^2 \propto R^3$

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# TEACHING PLAN (SYNOPSIS)

Month : November  Subject : physics

TOPIC : thermodynamics  Paper : 5I

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Brownian motion |
| Topic Synopsis | |

work done in isothermal & adiabatic processes.

Reversible

$$W = 2.3026\, RT \log_{10} \frac{V_2}{V_1}$$

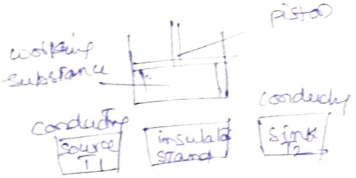
$$W = \frac{1}{\gamma - 1}(P_2V_2 - P_1V_1)$$

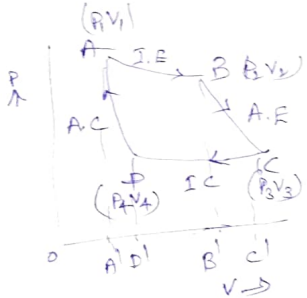
Reversible & irreversible processes

I law of Thermodynamics

$$dQ = dU + dW$$

Carnots engine




$$Q_1 - Q_2 = W_1 - W_2$$

| | |
|---|---|
| Thrust areas | Ref books. |
| Skill to be learnt by Student | Different thermal systems |
| Examples/Illustrations | cycle Tube burst |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Brijlal Subrahmanyam etc. |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

$$\eta = 1 - \frac{T_2}{T_1}$$

Carnots Th : No engine can be more efficient than Reversible engine working both same two temp

$$K = \frac{T_2}{T_1 - T_2}$$

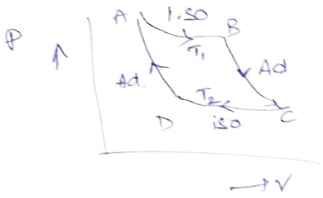
Entropy $dS = \frac{dQ}{T}$

$$\frac{Q_1}{T_1} = \frac{Q_2}{T_2} = S_p.$$

change in entropy in reversible & irreversible processes.

$$\Delta S = \oint \frac{dQ}{T} = 0 \; ; \quad \frac{Q_2}{T_2} - \frac{Q_1}{T_1} > 0 \text{ +ve}$$

TS diagram





$$\eta = \frac{Q_1 - Q_2}{Q_1} = \frac{T_1 - T_2}{T_1}$$

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# TEACHING PLAN (SYNOPSIS)

Month : November Subject : physics

TOPIC : low Temp physics Paper : 6B

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | . low Temp |
| Topic Synopsis | |

production of low Temp

Freezing mixtures

Joule-Thomson effect :-

when a gas under const pressure is passed through a porous plug to a region of lower const pressure gas suffers change in temp, $U + PV = Const$

Regenerative cooling

method of liquifaction of gases

liquifaction of air

production of liq $H_2$

liq He

liq $N_2$

Adiabatic demagnetization

| | |
|---|---|
| Thrust areas | · standard books. |
| Skill to be learnt by Student | cooling of gases |
| Examples/Illustrations | Daily observation. |
| Additional Inputs | Library Journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Journals from internet |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

properties of super conductors

1. perfectly diamagnetic
2. ~~Zero~~ electrical resistivity

Type I & Type 2 super conductors.

Meisnar effect

BCS Theory.

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# TEACHING PLAN (SYNOPSIS)

Month : November  Subject : physics

TOPIC : Solar energy  Paper : TB.

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | solar energy radiation. |
| Topic Synopsis | |

Basic concepts of solar energy

spectral distribution of solar radiation

Solar constant. def :-

The rate at which energy reaches the earth surface from sun is generally 1.388 watts / meter$^2$

Standard time.

local apparent time - longitudinal effect

Equation of time

Direct, diffuse & local time

Pyrheliometer - working.

Direct radiation measurement.

| | |
|---|---|
| areas | Library |
| be learnt by | Concept of Solar energy |
| s/Illustrations | Sun light & its effects. |
| l Inputs | Journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Articles from Internet |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

pyranometer - working principle

Diffuse radiation measurement

Distinction betn pyro & pyrheliometer?.

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# TEACHING PLAN (SYNOPSIS)

Month : December  Subject : physics

TOPIC : Central forces  Paper : I

| | |
|---|---|
| Hours Required | |
| Learning Objectives | |
| Previous Knowledge to be reminded | |
| Topic Synopsis | |

Conservative nature of central force :-

Eqn of motion under central force

$$\frac{d^2u}{d\theta^2} + u = \frac{p^2}{mh^2u^2}$$

GPS - Global positioning system.

Derivation of Kepler laws.

| | |
|---|---|
| hrust areas | Library |
| ill to be learnt by udent | motion of planets. |
| amples/Illustrations | planetary system |
| ditional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | P.O.T by D S Sadhasivam |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

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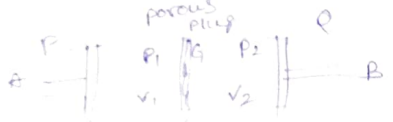
# TEACHING PLAN (SYNOPSIS)

Month : December Subject : physics

TOPIC : Low Temp physics Paper : II

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | low Temp. Absolute Temp. |
| Topic Synopsis | |

Joule Kelvin effect - porous plug Expt -




$U + PV = \text{const.}$

- for a perfect gas $T_1 = T_2 \Rightarrow$ J-K effect is Zero.
- for Real gas $U_2 > U_1$ Above Boyles Temp
  $U_2 < U_1$ below Boyle's Temp
  $U_2 = 1$ At " "

Distinctions betn Joules expansion and Adiabatic expansion & J-K Expansion.

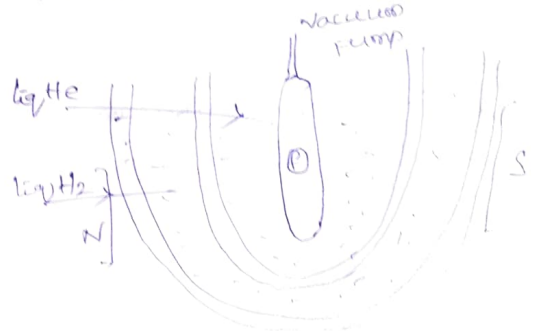
| | |
|---|---|
| Thrust areas | . Library |
| Skill to be learnt by Student | cooling of gases |
| Examples/Illustrations | Liq $N_2$ plant |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Regenerative cooling

Liquifaction of He

Adiabatic demagnetization:




$\chi = \frac{1}{T^3}$.

working of Refrigirator

Effects of CFCs on ozone layer

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# TEACHING PLAN (SYNOPSIS)

Month : December  Subject : physics

TOPIC : Solar Energy  Paper : GB

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Heat Transfer |
| Topic Synopsis | |

Solar thermal collectors :-

S.T.C.s Types of Thermal collectors

Flat plate collector

liquid heating type collector

Energy balance eqn and efficiency factor

collector overall heat loss coefficient

collector efficiency factor

collector heat removal factor

collector flow factor

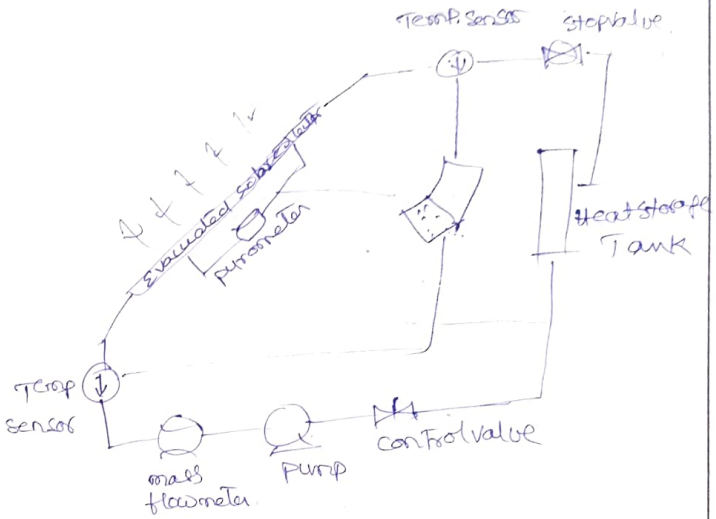
Testing of flat plate collector

Solar water heating systems - Types

Natural & forced conduction Types

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | construction of Solar Thermal energy |
| Examples/Illustrations | Solar plant |
| Additional Inputs | Journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Journals. |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

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# TEACHING PLAN (SYNOPSIS)

Month : January  Subject : physics

TOPIC : Relativity  Paper : I

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | velocity of light, small velocities. |
| Topic Synopsis | |

Relativity –

Absolute frames, inertial frames

frame of reference.

Galelian Transformation eqns

$x = x' + vt$

$y = y'$

$z = z'$

$t = t'$

michelson interferometer

Explanation of –ve result.

postulates of special theory of relativity.

Variation of mass with velocity

$m_0 = \frac{m_0}{\sqrt{1 - v^2/c^2}}$

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | variation of mass with high velocity |
| Examples/Illustrations | Nucleons energy |
| Additional Inputs | Journals. |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Unified physics, P.R. Vasudeva |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Lorentz Transformation eqns

$x = \frac{x' + vt'}{\sqrt{1 - v^2/c^2}}$

$y = y'$

$z = z'$

$t = t' \cdot \sqrt{1 - v^2/c^2}$

Applications : Length contraction $l = l'\sqrt{1 - v^2/c^2}$

Time dilation $t' = \frac{t - vx/c^2}{\sqrt{1 - v^2/c^2}}$

Einsteins eqn $E = mc^2$

Rest mass $m = m_0\sqrt{1 - v^2/c^2}$

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# TEACHING PLAN (SYNOPSIS)

Month : January  Subject : physics

TOPIC : Unit IV  Paper : II

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Radiation Black body |
| Topic Synopsis | |

Black body

Ferrys black body

weins law of displacement $\lambda_m T = \text{const}$

Rayleigh - Jeans formula :-

$$E_\lambda d\lambda = \frac{8\pi KT}{\lambda^4} d\lambda$$

Planks radiation law -

$$E = \frac{h\nu}{\left(e^{\frac{h\nu}{KT}} - 1\right)}$$

pyrometers

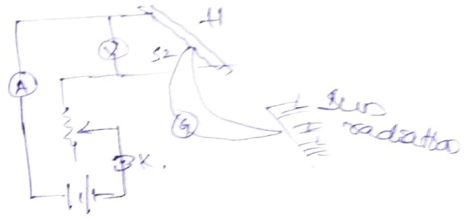
Solar const :

Angstroms py

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | conversion of Black body radiation into temperature |
| Examples/Illustrations | Text books |
| Additional Inputs | Journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Brijlal Subramanyam |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Angstroms pyrheliometer

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# TEACHING PLAN (SYNOPSIS)

Month : ~~February~~ January  Subject : physics

TOPIC : (Q.) Temp physics  Paper : GB

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | |
| Topic Synopsis | |

Principles of Refrigiration :—

Natural and artificial refrigiration

Stages of refrigiration

Types of refrigeratoo

Vapour compressioo

vapour absorptioo refrn system

Refrn cycle & block diagram

Air conditioning

Refrs

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | working of Refrigirators |
| Examples/Illustrations | domestic coolers, fridges |
| Additional Inputs | domestic observatioo |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Refrigirants - Types.

1 ideal refrigirants

2 properties of refrigirants

3. classification of Refrigirants

4 commonly used refrgrs

5 Eco friendly refrgirants

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# TEACHING PLAN (SYNOPSIS)

Month : January  Subject : paper physics.

TOPIC : solar cells  Paper : 4B

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | |
| Topic Synopsis | |

Semiconductor interface. types

1. Homo junction solar cell
2. Hetero jn cell
3. Shottky barrier

Advantages & drawbacks

photovoltaic cells. equivalent circuit

output parameters

Conversion efficiency

Quantum efficiency

measurement of I V - chs,

Serial & Resonant resistance.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | working of solar cells |
| Examples/Illustrations | solar panels |
| Additional Inputs | Journals. |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Journals, internet |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Series & parasitant resistance, effect of them on efficiency of cell

Effect of light intensity inclination and temperature on the efficiency of cell

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# TEACHING PLAN (SYNOPSIS)

Month : February  Subject : physics

TOPIC : oscillations Vibrating Strings  Paper : I

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | SHM |
| Topic Synopsis | |

Simple harmonic oscillator :-

$$\frac{d^2x}{dt^2} + \omega^2 x = 0$$

velocity - $V_{max} = \omega a$

Periodic Time, frequency, phase, epoch.

Damped harmonic oscillator

$$\frac{d^2x}{dt^2} + 2b\frac{dx}{dt} + \omega^2 x = 0$$


Logarithmic decrement, Relaxation time

Quality factor

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | different types of oscillations. |
| Examples/Illustrations | pendulum, cradle. |
| Additional Inputs | Routine daily observation |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | D S Radhue |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Forced vibrations.

$$\frac{d^2x}{dt^2} + 2b\frac{dx}{dt} + \omega^2 x = f\sin pt$$

$$A = \frac{f}{\sqrt{(\omega^2 - p^2) - 4b^2p^2}} \approx \frac{f}{\sqrt{(\omega^2 - p^2)}} = \frac{f}{\omega^2} = \text{const}$$

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# TEACHING PLAN (SYNOPSIS)

Month : February  Subject : physics

TOPIC : Thermodynamics  Paper : II

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Black body concept |
| Topic Synopsis | |

Blackbody & spectral energy distribution.
of blackbody
stephans law
Kirchhoffs laws
wein's displacement law
Raleigh jeans law
planks law of blackbody radiation
weins law solar constant.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | function of Blackbody |
| Examples/Illustrations | Black objects. |
| Additional Inputs | journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

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# TEACHING PLAN (SYNOPSIS)

Month : February  Subject : physics

TOPIC : Components of Refrigeration  Paper : GB

| | |
|---|---|
| Hours Required | 10 + 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | |
| Topic Synopsis | |

Refrigerator and working

Block diagram)




COP - coefficient of performance

Tonnes of Refrigeration TR

Energy efficiency Ratio EER

Refrigerator components & Types of compressers

Evaporators, condensers

Their functional aspects.

Defrosting in Refrgs

Refrigerant leakage & detection

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | working of Refrigerators |
| Examples/Illustrations | domestic coolers |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Journals |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Applications

preservation of biological specimens

Liq $H_2$ & Liq $N_2$ in medical field.

Super conductive magnets in MRI

Tissue Ablation - cryosurgery.

cryogenic Rocket propulsion system

Applications of Refrgn - domestic, industrial

water cooling. food preservation.

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# TEACHING PLAN (SYNOPSIS)

Month : February  Subject : physics

TOPIC : Solar cells.  Paper : 7B

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | cells combination |
| Topic Synopsis | |

Types of solar cells.

Crystalline silicon solar cells - I-V

Amorphous Si cells

Thin-film solar cells CdTeCdS

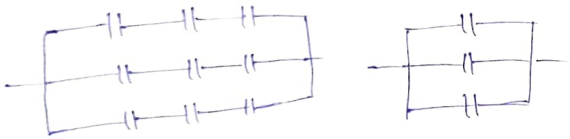
$CuInGaSe_2$ CdS.

Advantages & limitations

multijn cells

module fabrication

modules in series & in parallel.



| | |
|---|---|
| Thrust areas | library |
| Skill to be learnt by Student | working of solar panels |
| Examples/Illustrations | solar panels on buildings |
| Additional Inputs | journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | internet |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

solar P.V systems

Energy storage in pv systems

modes of energy storage

Electrochemical storage.

primary & secondary cells.

Solid state battery

molten. solvent battery.

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# TEACHING PLAN (SYNOPSIS)

Month : march 23 Subject : physics

TOPIC : Ultrasonics Paper : I

| | |
|---|---|
| Hours Required | 6 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Range of sound waves |
| Topic Synopsis | |

ultrasonics - $>20KH_z$ $<20,000\ KH_z$

production - magneto striction method

piezo electric method

properties, characteristics,

Applications of ultrasonics.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Ultrasonics. waves & used. |
| Examples/Illustrations | Bats, Jet planes |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resonick & Haliday, Unified 1 |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

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# TEACHING PLAN (SYNOPSIS)

Month : JULY 22 Subject : PHYSICS

TOPIC : Interference of light Paper : II OPTICS

| | |
|---|---|
| Hours Required | 12 hrs |
| Learning Objectives | |
| Previous Knowledge to be reminded | Basics of properties of light like reflection, refraction etc. |
| Topic Synopsis | Interference of light. |

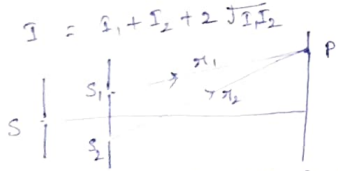
Def :- The modification of intensity obtained by the superposition of two or more beams of light is called interference. It is obtained when

1) the sources of light are coherent & monochromatic
2) the wave trains suffer constant or zero phase diff

It is 2 types

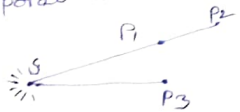
1. constructive ⇒ If the resultant intensity is more than individual intensities.
2. Destructive ⇒ If the resultant intensity is less than individual intensities.

$I = I_1 + I_2 + 2\sqrt{I_1 I_2}$




coherence of light sources is essential for interference. It is 2 Types.

1. Temporal coherence 2. Spatial coherence.




| | |
|---|---|
| Thrust areas | Text book Unified Volume II optics. |
| Skill to be learnt by Student | phenomenon of interference & its Types |
| Examples/Illustrations | Soap bubbles |
| Additional Inputs | PPT |

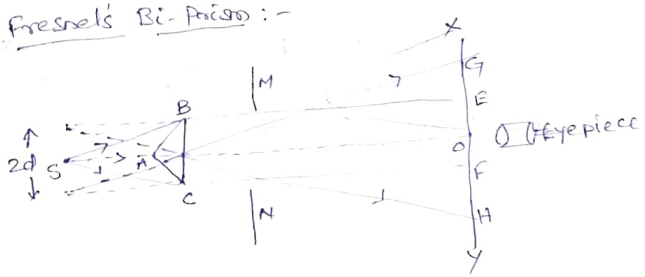
| | |
|---|---|
| Teaching Models used | Lab equipment |
| Teaching Aids used | Virtual Board & Blackboard. |
| References cited | Unified physics; optics by Brijlal & Subrahmanyam |
| Student Activity planned after the teaching | Quiz & Seminars |
| Activity planned outside classes | |
| Any other | — |

For sustained interference, required conditions are coherent sources, same λ/ν, equal amplitudes of two waves, narrow slits, same dirn & same state of polarisation.

Types of interference :- It is 2 types

1. Division of wavefront :- It is obtained by reflection, refraction & diffraction.
   Ex :- Fresnel's bi-prism, Lloyd's mirror
2. Division of Amplitude :- It is obtained by partial reflection or refraction. Here diffn effect is highly reduced. Ex :- Newton's rings, Michelson interferometer

Fresnel's Bi-Prism :-

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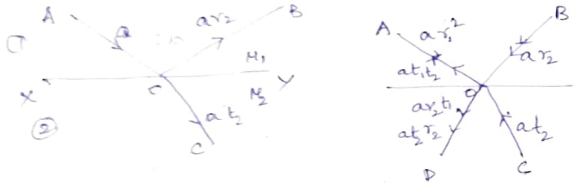
# TEACHING PLAN (SYNOPSIS)

Month : July. Subject : physics.

TOPIC : Interference Paper : II

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | concept of interference |
| Topic Synopsis | |

**phase change on Reflection:-** In the absence of any absorption a light ray that is reflected or refracted will retrace the original path if its direction is reversed.



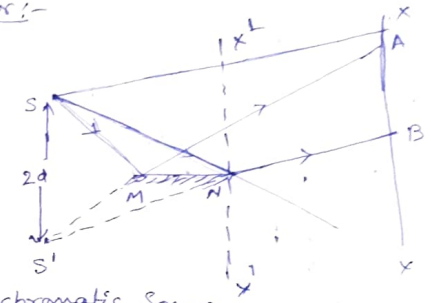

$r_2 = -r_1$

- ve sign indicates that there is a phase change of $\pi$ for reflection from rarer to denser / denser to rarer medium. This is Stoke's theorem.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Effects of reflection |
| Examples/Illustrations | Daily experiences |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Brijlal Subrahmanyam |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

**Lloyd's Mirror:-**




S → monochromatic source

S' → virtual source

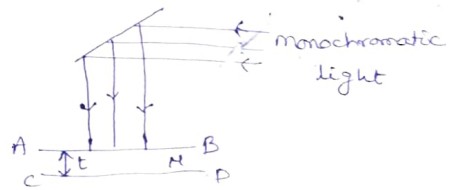
MN → mirror

XY → Screen

X'Y' → Shifted Screen, place of zero ordered fring

$\lambda = \frac{\beta \cdot 2d}{D}$ $\therefore \beta = \frac{\lambda D}{2d}$

**Interference By division of Amplitude :-**




t → thickness of air/ medium

μ → Refractive index of medium.

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→ contd

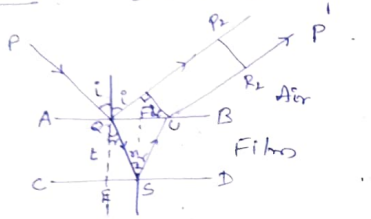
# TEACHING PLAN (SYNOPSIS)

Month : July 22 Subject : physics

TOPIC : Interference. Paper : II

| | |
|---|---|
| Hours Required | contd from previous page |
| Learning Objectives | |
| Previous Knowledge to be reminded | |
| Topic Synopsis | |

cosine law :→ (1) For reflected light. Parallel Surface.

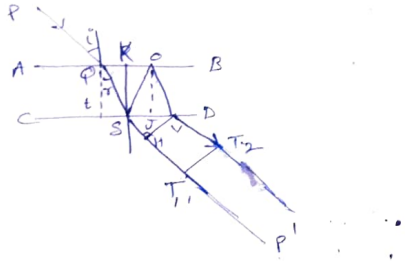



$\Delta = 2\mu t \cos r = n\lambda$ for dark light

$= (n+1)\frac{\lambda}{2}$ for bright light.

is reflected light.

(2) for Transmitted light.




| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Effects of interference |
| Examples/Illustrations | soap bubbles |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halidays |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

path difference $\Delta = 2\mu t \cos r$

1) For brightness, $\Delta = 2\mu t \cos r = n\lambda$

2) for darkness, $\Delta = 2\mu t \cos r = (2n+1)\frac{\lambda}{2}$ } for $n = 0, 1, 2 \ldots$

Abstract:- A film which appears bright in the reflected light will appear dark in the transmitted light and vice versa.

The patterns in the two cases are complementary to each other.

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# TEACHING PLAN (SYNOPSIS)

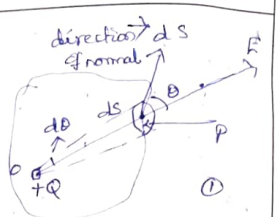
Month : July  Subject : physics

TOPIC : Gauss law  Paper IV Electricity & Magnetism

| | |
|---|---|
| Hours Required | 8 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Basics of electric field, potential, charge |
| Topic Synopsis | |

Gauss law :-

$$\Phi_E = \oint_S E.dS = \left(\frac{1}{\varepsilon_0}\right) Q$$




①

Def :- Total normal electric flux $\Phi_E$ of an electric field ~~through~~ over any closed surface

The total normal electric flux $\Phi_E$ over a closed surface in an electric field is $\left(\frac{1}{\varepsilon_0}\right)$ times the total charge Q enclosed within the surface.

$$\Phi_E = \oint_S E\,dS = \oint_S E.ds\cos\theta = \left(\frac{1}{\varepsilon_0}\right) Q$$

$\varepsilon_0$ → Permitivity of free space

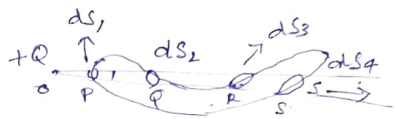
1) when the charge is within the surface,

$$\Phi_E = \frac{Q}{\varepsilon_0} \quad \text{fig ①}$$

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Laws of electrostatics. |
| Examples/Illustrations | charged particles |
| Additional Inputs | Journals |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Black Board, Virtual class |
| References cited | Electricity & Magnetism Satya prakash, Unified physics Vol 2 |
| Student Activity planned after the teaching | Quiz, Seminar [Resnick & Halliday, |
| Activity planned outside classes | |
| Any other | |

2) when the charge is outside the surface,




Electric flux at P through area $dS_1 = \left[\frac{-Q}{4\pi\varepsilon_0}\right] d\omega$

" " Q " $dS_2 = \left[\frac{+Q}{4\pi\varepsilon_0}\right] d\omega$

" " R " $dS_3 = \left[\frac{-Q}{4\pi\varepsilon_0}\right] d\omega$

" " S " $dS_4 = \left[\frac{+Q}{4\pi\varepsilon_0}\right] d\omega$

Total electric flux = 0

If $\rho$ is the charge density, then $Q = \iiint \rho\, dV$

$$\varepsilon_0 \oint E.ds = \iiint \rho\, dV$$

$$\therefore \varepsilon_0 \iiint \text{div}\, E\, dV = \iiint \rho\, dV$$

$$\Rightarrow \varepsilon_0 \text{div}\, E = \rho \quad \text{or} \quad \text{div}\, E = \frac{\rho}{\varepsilon_0}$$

In vacuum, $D = \varepsilon_0 E$ or $E = \frac{D}{\varepsilon_0}$

or $\text{div}\, D = \rho$ or $\nabla . D = \rho$

This is differential form of Gauss law.

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# TEACHING PLAN (SYNOPSIS)

Month: July  Subject: physics

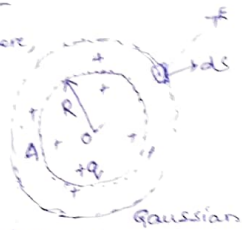
TOPIC: Equipotential Surfaces.  Paper: II A

| | |
|---|---|
| Hours Required | 4 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Electric potential V, R, emf, i. |
| Topic Synopsis | |

Electric field intensity Due to :-

1) Uniformly charged sphere :-

a) when point P is outside the sphere,




A is a sphere uniformly charged
R is its radius
+q is charge on the sphere

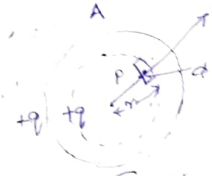
the sphere behaves as though the entire charge is concentrated at the centre.

$$E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^3}\vec{r} \text{ Newton/coulomb.}$$

b) when the point P is on the surface, $r = R$,

$$\therefore E = \frac{1}{4\pi\varepsilon_0}\frac{q}{R^2} \text{ Newton/coulomb.}$$

c) At a point inside the sphere,



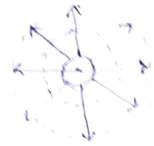

$$E = \frac{1}{4\pi\varepsilon_0}\frac{qr}{R^3}$$


| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Basics of electricity |
| Examples/Illustrations | |
| Additional Inputs | Nil |

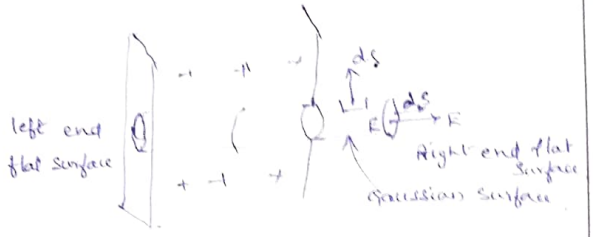
| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Black board : virtual board |
| References cited | Unified physics vol II : Resnick & Halliday Electricity & Magnetism : Satyaprakash |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Equipotential Surfaces :-

The locus of all points which have the same electric potential is called equipotential surface.



Electric Field intensity due to an infinite long conducting sheet :-




Infinite long conducting sheet

$$E = \frac{\sigma}{\varepsilon_0}$$

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# TEACHING PLAN (SYNOPSIS)

Month : July 22 Subject : physics

TOPIC : Dielectrics E & M fields Paper : IV Electricity & Magnetism.

| | |
|---|---|
| Hours Required | 6 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Dielectric material properties. |
| Topic Synopsis | |

Relation between D, E & P vectors

E → Electric Intensity

D → Electric displacement

P → Electric polarisability.

$D = \varepsilon_0 E + P$

Also $\oint D \cdot ds = q$

The surface integrals over any charged surface (flux of D) is equal to the free charge only within the surface.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | D, E, P concepts, relations. |
| Examples/Illustrations | charged particles & influence of E |
| Additional Inputs | - PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Electricity & Mag from Resnick & Halliday |
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| Activity planned outside classes | |
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Dielectric constant

Susceptibility.

Boundary conditions at dielectric surface

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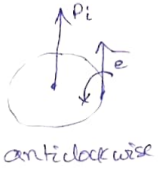
# TEACHING PLAN (SYNOPSIS)

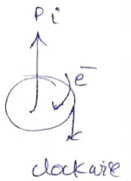
Month : July  Subject : physics

TOPIC : Atomic & Molecular Physics  Paper : IV B modern physics

| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Basics of Atomic Structure |
| Topic Synopsis | |

Atomic Structure :-




vector Atom model :-

1. SOI - spin orbit interaction
2. Space quantisation.

Stern Gerlach Expt:

Splitting of spectral lines


| | |
|---|---|
| Thrust areas | Reference books |
| Skill to be learnt by Student | Atomic Structure |
| Examples/Illustrations | Structure books. |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Atomic physics by J B Rajam |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

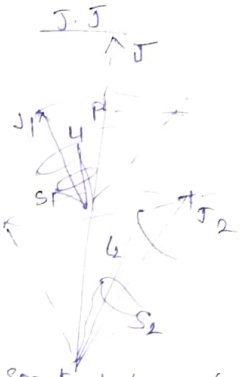
Quantum Nos Associated with vector Atom model

1. principal / Total Q no. n
2. orbital Q no l
3. spin Q no s
4. Total angular Q no j
5. Mag. orbital Q no $m_l$
6. Mag spin Q no $m_s$
7. Mag total ang. momtm Q. no $m_j$

coupling schemes

L-S


J-J




Zeeman effect :- Splitting of spectral lines in the external mag. field. Qualitative Treatment.

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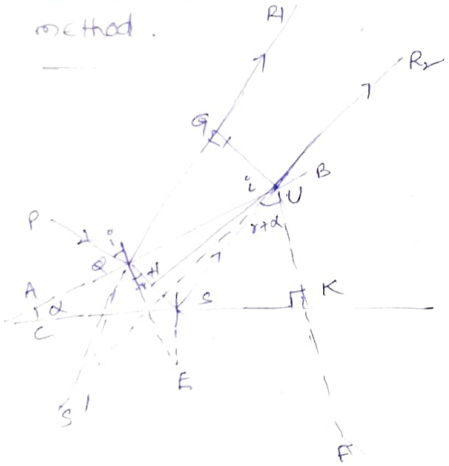
# TEACHING PLAN (SYNOPSIS)

Month : August 22 Subject : Physics

TOPIC : optics interference Paper : II

| | |
|---|---|
| Hours Required | 8 |
| Learning Objectives | |
| Previous Knowledge to be reminded | reflection & transmission of light |
| Topic Synopsis | |

wedge method.




$2\mu t\cos(r+\alpha) = (2n+1)\frac{\lambda}{2}$ for maxima

$2\mu t\cos(r+\alpha) = n\lambda$ for minima.

Interference in thin films.

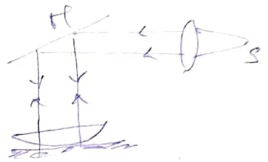
Newtons Rings.

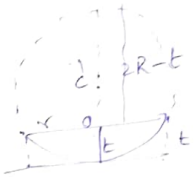
from Reflected light Patterns

from Transmitted light

| | |
|---|---|
| Thrust areas | library |
| Skill to be learnt by Student | effects of interference in diff planes |
| Examples/Illustrations | non parallel glass plates. |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Jenkins & white. |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | practical. |

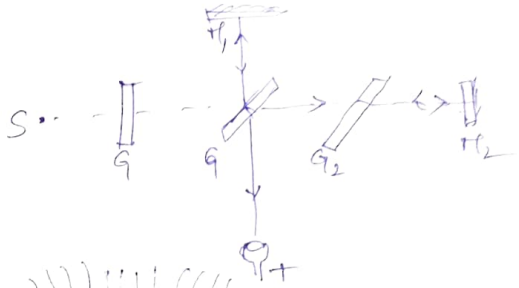



$r^2 = (2n+1)\frac{\lambda}{2}R$ for bright fringe

$r^2 = n\lambda R$ for dark fringe.

Michelson Interferometer.




$\lambda = \frac{2d}{N}$

→ contd

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# TEACHING PLAN (SYNOPSIS)

Month : August 22 Subject : physics

TOPIC : Diffraction Paper : II

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | phenomenon of diffraction |
| Topic Synopsis | |

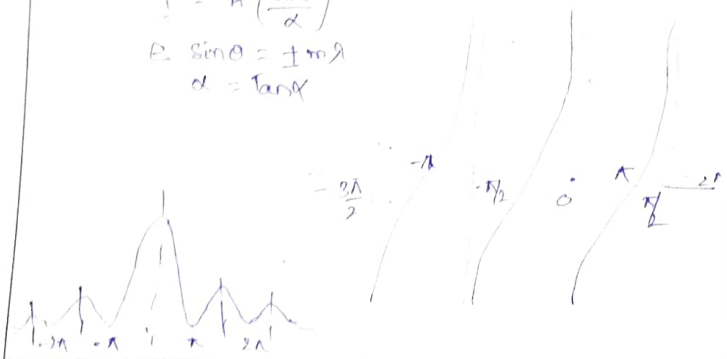
Fraunhofer diffrn

Fresnel's diffrn

$$I = A^2\left(\frac{\sin\alpha}{\alpha}\right)^2$$

$\because \sin\theta = \pm n\lambda$

$\alpha = \pi n$

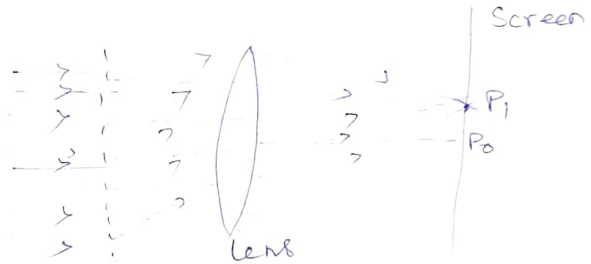



| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Diffraction & its applications |
| Examples/Illustrations | Grating |
| Additional Inputs | PPT |

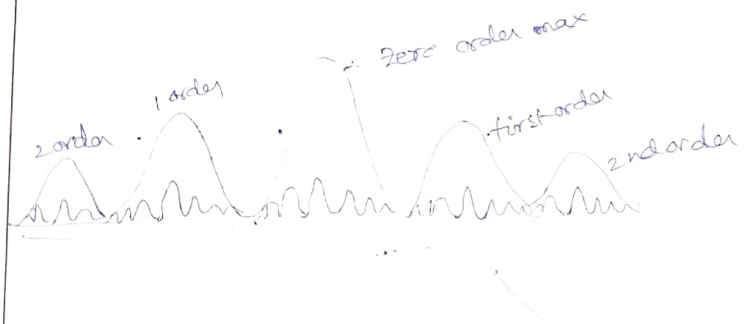
| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Limit of Resolution

Fraunhofer diffrn due to diffrn grating :-




$$I = R^2 = \left(A\frac{\sin\alpha}{\alpha}\right)^2\left(\frac{\sin N\beta}{\beta}\right)^2$$

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# TEACHING PLAN (SYNOPSIS)

Month : August 22 Subject : physics

TOPIC : ~~Diffraction~~ polarisation Paper : II

| | |
|---|---|
| Hours Required | 8 |
| Learning Objectives | |
| Previous Knowledge to be reminded | polarisation basics |
| Topic Synopsis | |

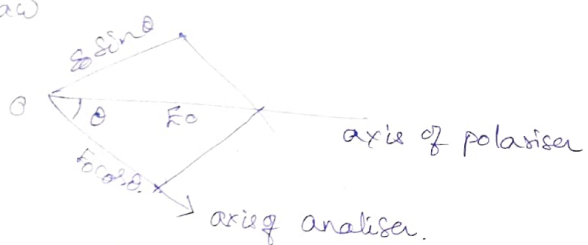
polarisation

plane polarisation

unpolarised light.

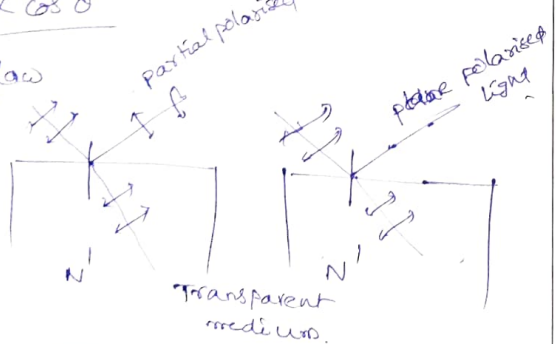
circular & elliptical polarisation

Malus law




$I\theta \propto \cos^2\theta$

Brewsters law



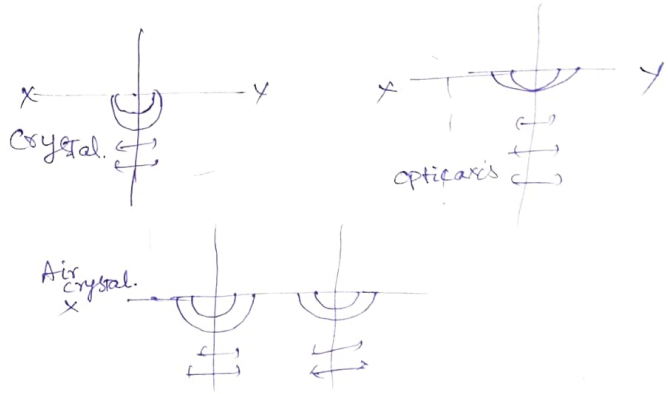

| | |
|---|---|
| Thrust areas | Textbooks. |
| Skill to be learnt by Student | polarisation, polaroid & uses. |
| Examples/Illustrations | polaroid lenses |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

$\mu = \tan\theta_p$

$\theta_{p+r} = 90^\circ$ Brewsters law.

Double Refraction :- Nicol prism.




Zone plate.

Half wave plate $d = (2m+1)\frac{\lambda}{2(\mu_e - \mu_o)}$

Quarter wave plate $d = (2m+1)\frac{\lambda}{4(\mu_e - \mu_o)}$ $m = 0, 1, 2, 3 \ldots$

Laurents half shade polarimeter

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# TEACHING PLAN (SYNOPSIS)

Month : September 22 Subject : physics

TOPIC : Lasers fibre optics Paper : I

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Transition of $\bar{e}$ |
| Topic Synopsis | |

LASER - Light Amplification By Stimulated Emission of light.

Stimulated emission  Spontaneous emission


Einsteins coefficients

$$\frac{N_{ST}}{N_{ab}} = \frac{B_{21}}{B_{12}} \frac{N_2}{N_1} \frac{P(\nu)}{P(\nu)}$$

$$= \frac{N_2}{N_1} \quad \because B_{12} = B_{21}$$

pumping

population inversion.

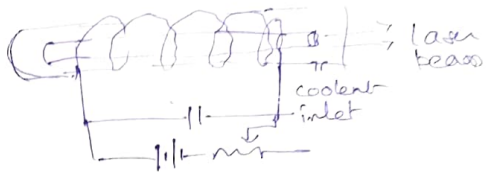
Types of lasers.

1. solid State - Ruby laser
2. liquid laser - DYE | TDAMC DYe laser.
   Diethyl Amino Anethyl coumarine
3. Gas : He-Ne laser ; $CO_2$ laser.
4. Semiconductor laser - Diode laser

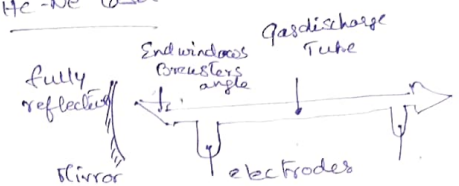
| | |
|---|---|
| Thrust areas | library |
| Skill to be learnt by Student | lasers production, uses |
| Examples/Illustrations | medical areas, laser shows |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Ruby laser.




He-Ne laser




He-Ne laser is a low power device, widely used

properties of lasers.

Applications of lasers.

- Holography.

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# TEACHING PLAN (SYNOPSIS)

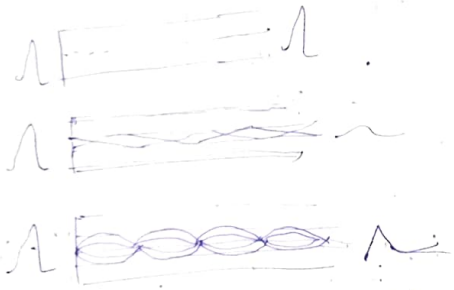
Month : September  Subject : physics

TOPIC : Fibre optics, Aberration  Paper : II

| | |
|---|---|
| Hours Required | 8 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Total internal Reflection. |
| Topic Synopsis | |

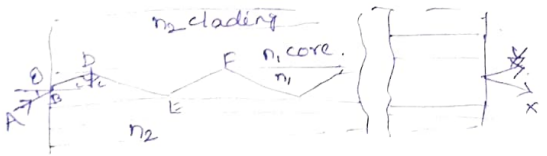
Fibre optics - Types.

principle - TOI - Total internal Reflection.



Types - Glass, plastic clad silica fibre

plastic fibres.




| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | communication with light |
| Examples/Illustrations | fibre cables. |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | Resnick & Halliday |
| References cited | |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Fibre size → 50M

Fibre Materials

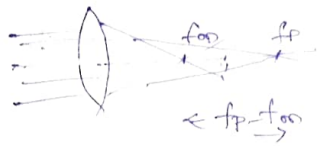
1. $GeO_2 - SiO_2$ as core ; $SiO_2$ cladding
2. $P_2O_5 - SiO_2$ core, $SiO_2$ cladding
3. $SiO_2$ - core; $B_2O_3 - SiO_2$ cladding
4. $GeO_2 - B_2O_3 - SiO_2$ core; $B_2O_3 - SiO_2$ cladding

Aberrations of lenses - chromatic, spherical

coma, Astigmatism.

Elimination of errors.

Achromatic doublet.

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# TEACHING PLAN (SYNOPSIS)

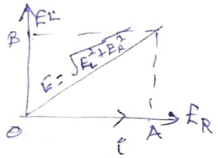
Month : August 22 Subject : physics

TOPIC : AC currents electro magnetics Paper : IV A

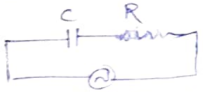
| | |
|---|---|
| Hours Required | 12 |
| Learning Objectives | |
| Previous Knowledge to be reminded | AC, DC difference, EM nature |
| Topic Synopsis | |

LR circuit


$\phi = \tan^{-1}\left(\frac{\omega L}{R}\right)$

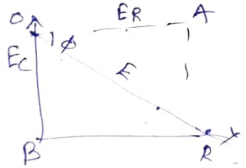



CR circuit




$\phi = \tan^{-1}\left(\frac{X_C}{R}\right)$

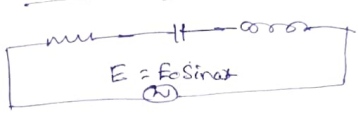
$E = \sqrt{(E_R^2 + E_C^2)}$

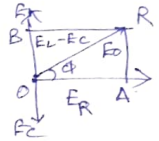



| | |
|---|---|
| Thrust areas | Text books |
| Skill to be learnt by Student | working & Uses of various circuits |
| Examples/Illustrations | Laboratory circuits |
| Additional Inputs | Lab equipment |

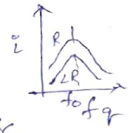
| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

LCR Series Resonant circuit.



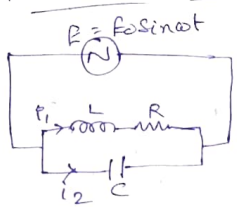



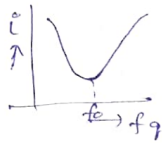

$$i = \frac{E_0}{\sqrt{R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2}} \cdot \sin(\omega t - \phi)$$




$$\phi = \tan^{-1}\left(\frac{\omega L - 1/\omega C}{R}\right) = \tan^{-1}\frac{X_L - X_C}{R}$$

LCR Parallel Resonant circuit :-




$$f = \frac{\omega}{2\pi} = \frac{1}{2\pi}\left[\frac{1}{LC} - \frac{R^2}{L^2}\right]^{1/2}$$

Quality factor $Q = \frac{2\pi f L}{R} = \frac{\omega L}{R}$.

$Q = \frac{\text{Energy stored}}{\text{Energy lost per period}}$

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# TEACHING PLAN (SYNOPSIS)

Month : August  Subject : physics

TOPIC : Maxwells eqns  Paper : IV A

| | |
|---|---|
| Hours Required | 8 |
| Learning Objectives | |
| Previous Knowledge to be reminded | R, L, V, I Basics. |
| Topic Synopsis | |

Power in AC circuit

$P_t = E_{rms} \times I_{rms} \times \cos\phi$.

$\cos\phi$ is power factor

Maxwells eqns.

differential form

1. $div E = \frac{\rho}{\varepsilon_0}$ or $\vec{\nabla} \cdot E = \rho$
2. $div B = 0$ $\quad \vec{\nabla} \cdot B = 0$
3. $curl E = -\frac{\partial E}{\partial t}$ or $\vec{\nabla} \times E = -\frac{\partial B}{\partial t}$
4. $curl B = \mu_0 \left( j + \varepsilon_0 \frac{\partial E}{\partial t} \right)$

integral form.

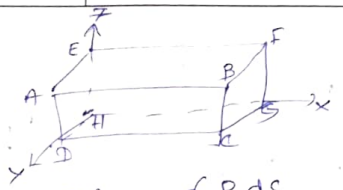
1. $\oint (E \cdot ds) = \frac{q}{\varepsilon_0}$
2. $\oint B \, ds = 0$
3. $\oint E \, dl = -\frac{d\phi}{dt}$
4. $\oint B \cdot ds = \left( \mu_0 + \varepsilon_0 \frac{\partial E}{\partial t} \right)$

Poynting Theorem - The amount of field energy passing through unit area of surface is to the direction of propagation of energy is called Poynting vector.

$\frac{\partial U}{\partial t} = -\oint_s P \cdot ds$ is, poyntingtheorem

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | AC circuits working principles |
| Examples/Illustrations | Em waves nature |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday. |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |




$\frac{\partial U}{\partial t} = -\oint_s P \cdot ds$.

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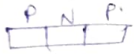
# TEACHING PLAN (SYNOPSIS)

Month : August  Subject : physics

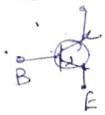
TOPIC : Electronics  Paper : IV A

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | semi conductors, types, manufacturing |
| Topic Synopsis | |

Semi conductors, Types, Pn diode

PNP 


NPN 

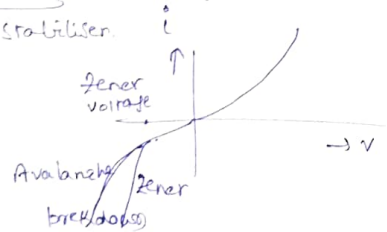

P.n diode 


V I chs




Zener diode - Heavily doped P.n diode. 

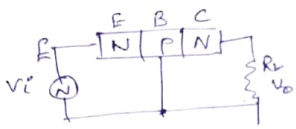

voltage Stabiliser



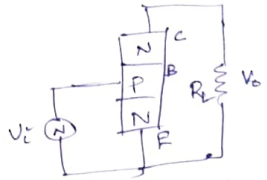

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | working of diodes, Transistors |
| Examples/Illustrations | Lab equipment. |
| Additional Inputs | lab equipments |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Hand book of electronics - Gupta, Kumar |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

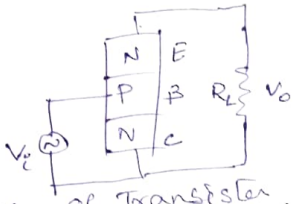
CB :-




CE :-




CC




Configurations of Transistor.

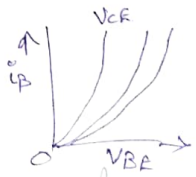
CE is more widely used.

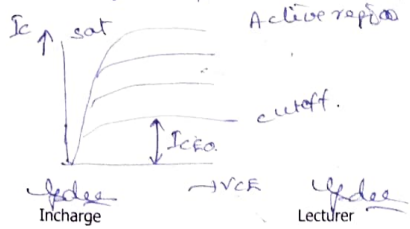
CE As an Amplifier.

$\alpha, \beta, \gamma$ relation :-

$\beta = \frac{\alpha}{1-\alpha}$ ; $\alpha = \frac{\beta}{1+\beta}$ $\gamma = \frac{1}{1-\alpha}$

$\gamma = 1+\beta$

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# TEACHING PLAN (SYNOPSIS)

Month : Aug  Subject : physics

TOPIC : Digital electronics  Paper : IV A

| | |
|---|---|
| Hours Required | (6) |
| Learning Objectives | |
| Previous Knowledge to be reminded | Decimal & binary numbers |
| Topic Synopsis | |

codes conversion :-

1. Decimal to binary
2. Binary to decimal

Binary addition, multiplication, subtraction division,

complements of numbers 1 & 2

Boolean algebra - De morgan's Theorems.

Laws

1. $\overline{A+B} = \bar{A}\cdot\bar{B}$
2. $\overline{A\cdot B} = \bar{A}+\bar{B}$

Gates

NOT

OR  $X = A+B$

AND  $X = A\cdot B$

NAND  $X = \overline{A\cdot B}$

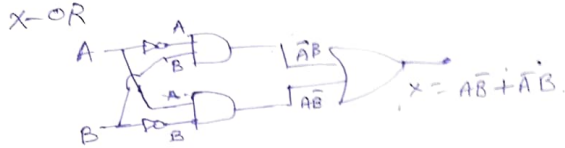
NOR  $X = \overline{A+B}$

Truth Tables.  X-OR Gate.  $X = A\bar{B}+\bar{A}B$

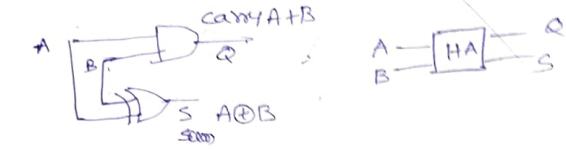
| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Binary nos codes, logic Gates |
| Examples/Illustrations | lab kits |
| Additional Inputs | lab kits |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

X-OR




Half adder




Full adder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# TEACHING PLAN (SYNOPSIS)

Month : August  Subject : physics

TOPIC : Raman effect, Matter waves  Paper : IV B

| | |
|---|---|
| Hours Required | 3 + 8 + 6 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Nucleus. |
| Topic Synopsis | |

Raman effect :- chs -


Δν → Raman shift. Quantum mechanical feather

Applications of Raman effect.

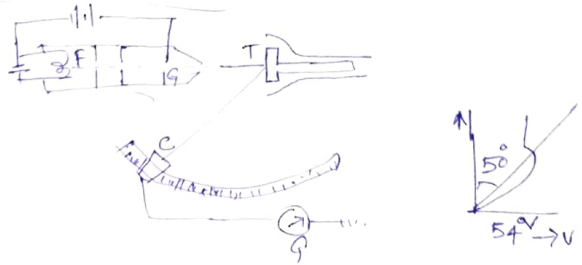
Matter waves — Nature likes symmetry

$$E = h\nu = \frac{hc}{\lambda}$$

$$\lambda = \frac{h}{mc} = \frac{h}{mv} = \frac{h}{p}$$

$\lambda = \frac{h}{\sqrt{2mE}}$ → De broglie wavelength.

Davisson Germer Expt -




| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by Student | Raman effect & applications |
| Examples/Illustrations | Blue of sky, Seas |
| Additional Inputs | Daily observations |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | J B Rajam - Atomic physics |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

wave velocity $v_p = \omega/k$ It is phase velocity also

phase of

Group velocity — The velocity with which energy in the group is transmitted.

Quantum mechanics

postulates — finite, single valued, continuous

properties, characteristics of $\psi$.

$$\int \psi^* \psi \, dV = \iiint |\psi|^2 dx dy dz = 1$$

Schroedinger eqns of wave

1. Time independent $\nabla^2\psi + \frac{2m}{\hbar^2}E\psi = 0$

2. Time dependent :- $\frac{-\hbar^2}{2m}\nabla^2\psi + V\psi = i\hbar\frac{\partial\psi}{\partial t}$

$$\hat{H}\psi = \hat{E}\psi$$

H → Hamiltonian operator

E : Energy operator

Eigen values & Eigen functions.

$$\hat{H}\psi = \hat{E}\psi$$

H is operator of wave fn.

Energy levels of particle enclosed in 1d potential box


$$E_n = \frac{n^2\hbar^2\pi^2}{2ma^2}$$

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# TEACHING PLAN (SYNOPSIS)

Month : August  Subject :

TOPIC : Nuclear physics  Paper :

| | |
|---|---|
| Hours Required | 10 |
| Learning Objectives | |
| Previous Knowledge to be reminded | Nuclear size, Nucleons |
| Topic Synopsis | |

Nuclear charge

Nuclear radius

Nuclear mass, packing factor.

$\Delta m = Z m_p + (A-Z) m_n - M$

$f = \frac{\Delta m}{A}$  $\Delta m \rightarrow$ mass defect.

Mag. dipole moment & Quadrupole moment.

Binding energy $BE = \Delta m . c^2$

Nuclear models

Liquid drop model

shell model. — Magic nos

Semi empirical mass formula

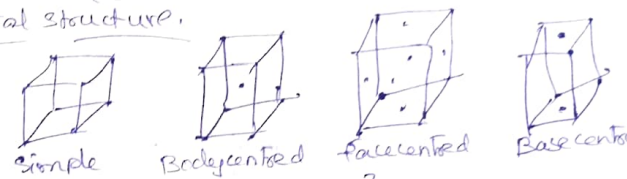
Gamma's theory of $\alpha$ decay.

Geiger Nuttel law.

| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by student | Nuclear properties, model, Crystal structure |
| Examples/Illustrations | PPT |
| Additional Inputs | PPT |

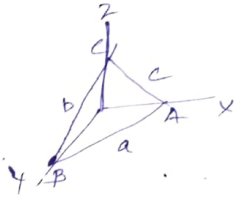
| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Nuclear physics - 2 Vols. |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

Crystal structure.




Miller indices.

Reciprocals of intercepts $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$




X ray diffraction:

Bragg's law — $2d\sin\theta = n\lambda$

Crystallography - Laue method.

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# TEACHING PLAN (SYNOPSIS)

Month : August 22 Subject : physics

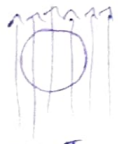
TOPIC : Superconductivity Paper : IV B.

| | |
|---|---|
| Hours Required | 6 |
| Learning Objectives | |
| Previous Knowledge to be reminded | conduction, Resistivity, Diamagnetism |
| Topic Synopsis | |

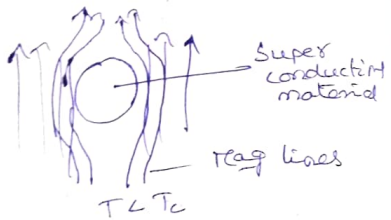
Superconductivity :- conductivity at very low temp (cryogenics)

1. Zero electrical Resistivity
2. perfect diamagnetism.

Meisner effect :- Isotope effect.

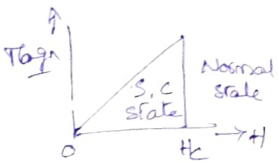


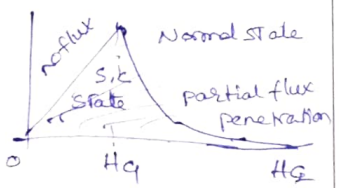
$T > T_c$




$T < T_c$

Type I, S.C. Type II S.C.




| | |
|---|---|
| Thrust areas | Library |
| Skill to be learnt by student | Superconductor properties, applications |
| Examples/Illustrations | diamagnetics behaviour |
| Additional Inputs | PPT |

| | |
|---|---|
| Teaching Models used | |
| Teaching Aids used | |
| References cited | Resnick & Halliday |
| Student Activity planned after the teaching | |
| Activity planned outside classes | |
| Any other | |

BCS – Bardeen, Couper, Schriffer Theory.

electron – lattice – electron Theory

couper pair

Applications of superconductors.

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