PHYSICS KNEC SYLLABUS AND THE CONTENTS

PAPER 1 TOPICS ARRANGED IN UNITS

Unit 1(Measurement I and measurement II)

Measurement I

Specific objectives

By the end of the topic the learner should be able to:

a) Define length, area,volume,mass,density,time interval and state the corresponding symbols and SI units
b) Convert other metric units to SI units
c) Estimate length, mass and time
d) Use accurately various measuring instruments
e) Determine experimentally the densities of substances
f) Solve numerical problems on density

Content

- ✓ Definition of length,area,volume,density and time
- ✓ Sin units and symbols
- ✓ Estimation of quantities
- ✓ Conversion of units
- ✓ Measuring instruments:metre rule, tape measure, beam balance, stop clock/watch, measuring cylinder, pipette and burette
- ✓ Experiments on density

Measurement II

Specific objectives

By the end of the topic, the learner should be able to

a) Measure length using vernier calipers and micrometer screw gauge

b) Estimate the diameter of a molecule of oil

c) Solve numerical problems in measurements

Content

- ✓ Measurement of length using vernier calipers and micrometer screw gauge
- ✓ Decimal places ,significant figures and standard forms
- ✓ Estimation of the diameter of a molecule of oil(relate to the size of HIV virus ,mention the effects of oil spills on health and environment
- ✓ Problems in measurements

Unit 2(Force, forces and moments, equilibrium and stability, Hooke's law, particulate nature of matter)

Force

Specific objectives

By the end of the topic, the learner should be able to:

a) Define force and state its SI unit
b) Describe the types of forces
c) Describe experiments to illustrate cohesion ,adhesion and cohesion
d) State the effects of force
e) State the difference between mass and weight, W=mg
f) Define scalar and vector quantities
g) Solve numerical problems involving W=mg

Content

- ✓ Definition of force
- ✓ Types of forces (include cohesion, adhesion and surface tension
- ✓ Experiments to demonstrate cohesion, adhesion and surface tension(actual measurement of surface tension not required)
- ✓ Effects of force
- ✓ Mass, weight and their relationship
- ✓ Scalar and vector quantities
- ✓ Problems involving W=mg

Particulate nature of matter

Specific objectives

By the end of the topic, the learner should be able to:

a) Give evidence that matter is made up of tiny particles
b) Describe experiments to show that particles of matter are at constant random motion
c) Explain the states of matter in terms of particle movement
d) Explain diffusion

Content

- ✓ Experiments to show that matter is made up of tiny particles (e.g cutting papers into small pieces ,dilution experiments etc)
- ✓ Brownian motion
- ✓ States of matter
- ✓ Diffusion (grahams law not require)

Turning effect of a force

Specific objectives

By the end of the topic the learner should be able to;

a) Define moment of a force about a point and state its SI unit
b) State and verify the principle of moments
c) Solve problems involving the principle of moments

Content

- ✓ Moment of force ,SI unit of moment of a force
- ✓ Principle of moments
- ✓ Problems on principle of moments(consider single pivot only)

Equilibrium and centre of gravity

Specific objectives

By the end of the topic the learner should be able to:

a) Define center of gravity
b) Determine experimentally the center of gravity of lamina objects
c) Identify and explain the states of equilibrium
d) State and explain factors affecting stability of an object
e) Explain the applications of stability
f) Solve numerical problems involving center of gravity and moments of a force

Content

- ✓ Center of gravity (experimental treatment required)
- ✓ States of equilibrium
- ✓ Factors affecting stability
- ✓ Problems on center of gravity and moments of a force(consider single pivot only)

Hooke's law

Specific objectives

By the end of the topic the learner should be able to:

a) State and verify experimentally Hooke's law
b) Determine the spring constant
c) Construct and calibrate a spring balance
d) Solve numerical problems involving Hooke's law

Content

- ✓ Hooke's law
- ✓ Spring constant
- ✓ Spring balance
- ✓ Problems involving Hooke's law

Unit 3 (Pressure, fluid flow, gas laws, floating and sinking)

Pressure

Specific objective

By the end of the topic the learner should be able to:

a) Define pressure and state its SI units
b) Determine pressure exerted by solids
c) Describe experiments to investigate factors affecting pressure in fluids
d) Derive the formula $p=\rho gh$
e) State the principle of transmission of pressure in fluids (Pascal's principle)
f) Explain atmospheric pressure and its effects
g) State and explain the applications of pressure
h) Solve numerical problems involving pressure

Content

- ✓ Definition of pressure
- ✓ Pressure in solids
- ✓ Factors affecting pressure in fluids(experimental treatment required0
- ✓ Derivation of $p=\rho gh$
- ✓ Atmospheric pressure
- ✓ Simple mercury barometer, manometers
- ✓ Applications of pressure :drinking staw,syringe,siphon,hydraulic press, hydraulic brakes, bicycle pump, force pump, lift pump
- ✓ Problems on pressure

Fluid flow

Specific objectives

By the end of the topic the learner should be able to:

a) Describe streamline flow and turbulent flow
b) Derive the equation of continuity
c) Describe experiments to illustrate Bernoulli's effect
d) Explain the Bernoulli's effect
e) Describe the applications of Bernoulli's effect
f) Solve numerical problems involving the equation of continuity

Content

- ✓ Streamline flow and turbulent flow
- ✓ Equation of continuity
- ✓ Bernoulli's effect(experimental treatment required)
- ✓ Applications of Bernoulli's effect: Bunsen burner, spray gun,carburetor,aerofoil and spinning ball
- ✓ Problems involving the equation of continuity

Gas laws

Specific objectives

By the end of the topic the learner should be able to:

a) State the gas laws for ideal gas
b) Verify experimentally the gas laws
c) Explain how absolute zero temperature may be obtained from the pressure –temperature and volume –temperature graphs
d) Convert Celsius scale to Kelvin scale of temperature
e) State the basic assumptions of the kinetic theory of gases
f) Explain the gas laws using the kinetic theory of gases
g) Solve numerical problems involving gas laws

Content

- ✓ Boyle's law, Charles' law, pressure law, absolute zero
- ✓ Kelvin scale of temperature
- ✓ Gas laws and kinetic theory of gases($p=\frac{1}{3}pc^2$ not required)
- ✓ Problems involving gas laws (including $\frac{PV}{T}$=constant)

Floating and sinking

Specific objectives

By the end of the topic the learner should be able to:

a) State Archimedes' principle
b) Verify Archimedes' principle
c) State the law of floatation
d) Define relative density
e) Describe the applications of Archimedes' principle and relative density
f) Solve numerical problems involving Archimedes principles

Content

- ✓ Archimedes' principle ,law of floatation (experimental treatment required)
- ✓ Relative density
- ✓ Applications of Archimedes' principle and relative density
- ✓ Problems of Archimedes' principle

Unit 4(Thermal expansion, heat transfer, quantity of heat)

Thermal expansion

Specific objectives

By the end of the topic the learner should be able to:

a) Define temperature
b) Describe the functioning of the various thermometers
c) Describe thermal expansion of solids, liquids and gases
d) Explain expansion in terms of particle behavior
e) Describe the unusual expansion of water and its effects
f) Explain the effects and applications of thermal expansion

Content

- ✓ Temperature
- ✓ Thermometer: liquid –in-glass, including clinical and six's maximum and minimum thermometers
- ✓ Expansion of solids, liquids and gases
- ✓ Effects of expansion and contraction
- ✓ Unusual expansion of water(anomalous expansion0
- ✓ Applications of thermal expansion, include bimetallic strip

Heat transfer

Specific objectives

By the end of the topic the learner should be able to:

a) State the difference between temperature and heat
b) State and explain the modes of heat transfer
c) Describe experiments to illustrate factors affecting heat transfer
d) Explain applications of heat transfer

Content

- ✓ Heat and temperature
- ✓ Modes of heat transfer
- ✓ Factors affecting heat transfer (experimental treatment required)
- ✓ Applications of heat transfer on vacuum flask, domestic hot water system, solar concentrators

Quantity of heat

Specific objectives

By the end of the topic the learner should be able to:

a) Define heat capacity and specific heat capacity
b) Determine experimentally specific heat capacity of solids and liquids
c) Define specific latent heat of fusion and specific latent heat of vaporization of steam
d) Determine experimentally the specific latent heat of fusion of ice and the specific latent heat of vaporization of steam
e) State factors affecting melting point and boiling point
f) Explain the functioning of a pressure cooker and a refrigerator
g) Solve problems involving quantity of heat

Content

- ✓ Heat capacity , specific heat capacity, units (experimental treatment required)
- ✓ Latent heat of fusion, latent heat of vaporization, units (experimental treatment required)
- ✓ Boiling and melting points
- ✓ Pressure cooker, refrigerator
- ✓ Problems involving quantity of heat ($Q=mc\Delta T$),($Q=mL$)

Unit 5(Linear motion, Newton's laws of motion, work, energy, uniform circular motion)

Linear motion

Specific objectives

By the end of the topic the learner should be able to:

a) Define distance,displacement,speed,velocity,and acceleration
b) Describe experiments to determine velocity and acceleration
c) Determine acceleration due to gravity
d) Plot and explain motion time graphs
e) Apply the equations of uniformly accelerated motion
f) Solve numerical problems on uniformly accelerated motion

Content

- ✓ Distance,displacement,speed,velocity,and acceleration(experimental treatment required)
- ✓ Acceleration due to gravity free-fall, simple pendulum
- ✓ Motion -time graphs-displacement time graphs, velocity time graphs
- ✓ Equations of uniformly accelerated motion

- ✓ Problems on uniformly accelerated motion

Newton's laws of motion

Specific objectives

By the end of the topic the learner should be able to:

a) State the Newton's laws of motion
b) Describe simple experiments to illustrate inertia
c) State the law of conservation of linear momentum
d) Define elastic collision, inelastic collision and impulse
e) Derive the equation F=ma
f) Describe the application of frictional force
g) Define viscosity
h) Explain terminal velocity
i) Solve numerical problems involving Newton's laws and the law of conservation of linear momentum

Content

- ✓ Newton's laws of motion (experimental treatment of inertia required)
- ✓ Conservation of linear momentum ,elastic collisions, inelastic collisions, recoil velocity ,impulse (oblique collisions not required)
- ✓ The relation F=ma
- ✓ Frictional force
  - Advantages and disadvantages
  - Viscosity and terminal velocity (qualitative treatment only)
- ✓ Problems involving Newton's laws and the law of conservation of linear momentum(exclude problems on elastic collisions)

Work energy power and machines

Specific objectives

By the end of the topic the learner should be able to;

a) Describe energy transformation
b) State the law of conservation of energy
c) Define work,energy,power,and state their SI units
d) Define mechanical advantage ,velocity ratio and efficiency of machines
e) Solve numerical problems involving work,energy,power and machines

Content

- ✓ Forms of energy and energy transformations
- ✓ Sources of energy-renewable ,non-renewable
- ✓ Law of conservation of energy
- ✓ Work, energy and power (work done by resolved force not required)
- ✓ Kinetic energy and potential energy
- ✓ Simple machines
- ✓ Problems of work,energy,power and machines

Uniform circular motion

Specific objectives

By the end of the topic the learner should be able to:

a) Define angular displacement and angular velocity
b) Describe simple experiments to illustrate centripetal force
c) Explain the applications of uniform circular motion
d) Solve numerical problems involving uniform circular motion

Content

- ✓ The radian, angular displacement and angular velocity
- ✓ Centripetal force; the relations $F=mv^2/_r$,$F=mr\omega^2$(derivation of the formula not necessary experimental treatment required)
- ✓ Applications of uniform circular motion
- ✓ Centrifuge, vertical ,horizontal circles, banked tracks(calculation on banked tracks and conical pendulum not required)
- ✓ Problems solving (applications of relations $F=mv^2/r$,$F=mrw^2$ in numerical calculations)

PAPER 2 TOPICS ARRANGED IN UNITS

Unit 1(Rectilinear propagation, reflection at curved surfaces, refraction of light and thin lenses)

Rectilinear propagation of light

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe experiments to show that light travels in a straight line
b) Describe the formation of shadows and eclipses
c) Explain the functioning of a pin-hole camera
d) State the laws of reflection
e) Verify experimentally laws of reflection
f) State the characteristics of images formed by plane mirrors
g) Explain the applications of reflection at plane surfaces
h) Solve numerical problems involving pinhole camera and mirrors inclined at an angle

Content

- ✓ Rectilinear propagation of light(experimental treatment required)
- ✓ Formation of shadows and eclipses(umbra and penumbra)
- ✓ Pin-hole camera :image formation and magnification
- ✓ Laws of reflection
- ✓ Images formed by plane mirrors, ray diagrams, parallel and inclined mirrors
- ✓ Devices based on reflection:periscope,kaleidoscope
- ✓ Problems on pin-hole camera and mirrors inclined at an angle

Reflection at curved surfaces

Specific objectives

By the end of the topic the learner should be able to:

a) Describe concave,convex,and parabolic reflectors
b) Describe using ray diagram the principal axis, principal focus, center of curvature and related terms
c) Locate images formed by curved mirrors by construction of ray diagrams
d) Determine experimentally the characteristics of images formed by a concave mirror
e) Define magnification
f) Explain the applications of curved reflecting surfaces

Content

- ✓ Concave, convex and parabolic reflectors
- ✓ Principal axis, principal focus, center of curvature and related terms
- ✓ Location of images formed by curved mirrors by ray diagram method(experiments on concave mirrors required)
- ✓ Magnification formula
- ✓ Application of curved reflectors

Refraction of light

Specific objectives

By the end topic the learner should be able to:

a) Describe simple experiments to illustrate refraction of light
b) State the laws refraction of light
c) Verify Snell's law
d) Define refractive index
e) Determine experimentally the refractive index
f) Describe experiments to illustrate dispersion of white light
g) Explain total internal reflection and its effect
h) State the application of total internal reflection
i) Solve numerical problems involving refractive index and critical angle

Content

- ✓ Refraction of light-laws of refraction (experimental treatment required)
- ✓ Determination of refractive index-Snell's law, real/apparent depth ,critical angle
- ✓ Dispersion of white light (experimental treatment required)
- ✓ Total internal reflection and its effect: critical angle
- ✓ Application of total internal reflection-prism periscope, optical fibres
- ✓ Problems involving refractive index and critical angle

Thin lenses

Specific objectives

By the end of the topic the learner should be able to:

a) Describe converging lenses and diverging lenses
b) Describe using ray diagrams the principal focus, the optical centre and the focal length of a thin lens
c) Determine experimentally the focal length of a converging lens
d) Locate images formed by thin lenses using ray diagram construction method
e) Describe the characteristics of images formed by thin lenses
f) Explain image formation in the human eye
g) describe the defects of vision in the human eye and how they can be corrected
h) Describe the use of lenses in various optical devices
i) Solve numerical problems involving the lens formula and the magnification formula

Content

- ✓ Types of lenses
- ✓ Ray diagrams and terms used
- ✓ Images formed –ray diagrams,characteristics,magnification
- ✓ Determination of focal length:(experimental treatment required-estimation method, lens formula, lens-mirror method
- ✓ Human eye, defects (short sightedness and long sightedness)
- ✓ Optical devices –simple microscope ,compound microscope, the camera
- ✓ Problem involving the lens formula and the magnification

Unit 2(Cells and simple circuits, current electricity, heating effect of electric current, mains electricity)

Cells and simple circuits

Specific objectives

By the end of the topic the learner should be able to:

a) Draw and set-up simple electric circuits
b) Identify circuit symbols
c) Define electric current
d) Explain the working of primary and secondary cells
e) Explain the care and maintenance of secondary cells

Content

- ✓ Simple electric circuits:cell,ammeter,voltmeter,variable resistor, connecting wires bulbs and switches
- ✓ Circuit symbols
- ✓ Electric current and its SI unit
- ✓ Primary and secondary cells. (simple cell, dry Leclanche cell, lead acid cell)

Current electricity

Specific objectives

By the end of the topic the learner should be able to:

a) Define potential difference and state its SI unit
b) Measure potential difference and electric current in a circuit
c) Verify ohm's law
d) Define resistance and state its si unit
e) Determine experimentally the voltage –current relationship[s for various conductors
f) Define e.m.f and explain internal resistance of a cell
g) Derive the formula for effective resistance of resistors in series and in parallel
h) Solve numerical problems involving ohm's law,resisitors in series and in parallel

Content

- ✓ Scale reading :ammeter, voltmeter
- ✓ Electric circuits:current,potential difference
- ✓ Ohm's law (experimental treatment required)
- ✓ Resistance: types of resistors, measurement of resistance, unit of resistance
- ✓ Electromotive force (e.m.f) and internal resistance of a cell. The relation (E=V+Ir)
- ✓ Resistors in series and parallel
- ✓ Problems involving ohm's law resistors in series and parallel

Heating effect of electric current

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe experiments to illustrate heating effect of an electric current
b) State the factors affecting the heating e by an electric current
c) Derive the equation for electrical energy and electrical power
d) Identify devices in which heating effect of an electric current is applied
e) Solve numerical; problems involving electrical energy and electrical power

Content

- ✓ Simple experiments on heating effect
- ✓ Factors affecting electrical energy, the relation P=VIt and P=VI
- ✓ Heating devices :electric kettle, electric iron, bulb filament, electric heater
- ✓ Problems involving electrical energy and electrical power

Mains electricity

Specific objectives

By the end of the topic the learner should be able to:

a) State the source of mains electricity
b) Describe the transmission of electric power from the generating station to the consumer
c) Explain the domestic wiring system
d) Define the kilowatt hour
e) Determine the electrical energy consumption and cost
f) Solve numerical problems involving mains electricity

Content

- ✓ Sources of mains electricity eg. Geothermal ,hydro, nuclear e.t.c
- ✓ Power transmission (include dangers of high voltage transmission)
- ✓ Domestic wiring system
- ✓ Kwh,consumption and cost of electricity
- ✓ Problems involving mains electricity

Unit 3(Electrostatic I and II)

Electrostatics I

Specific objectives

By the end of the topic the learner should be able to:

a) Describe electrostatic charging of objects by rubbing(experimental treatment required)
b) Explain the sources of electrostatic charges
c) State the two types of charges
d) State the basic law of charges (electrostatics)
e) State the unit of charge
f) Construct a simple leaf electroscope
g) Use a charged leaf electroscope to identify conductors , insulators and types of charge

Content

- ✓ Electrostatic charging of objects by rubbing 9experimetal treatment required)
- ✓ Types of charges and law of charges
- ✓ The coulomb
- ✓ Leaf electroscope :features ,charging and discharging
- ✓ Charging by contact and induction
- ✓ Identification of charge
- ✓ Conductors and insulators

Electrostatic II

Specific objectives

By the end of the topic the learner should be able to:

a) Sketch electric field patterns around charged bodies
b) Describe charge distribution on conductors of various shapes

c) Define capacitance and state its SI unit
d) Describe charging and discharging of a capacitor (calculation involving curves not required)
e) State the factors affecting the capacitance of a parallel plate capacitors
f) Sate the applications of capacitors
g) Solve numerical problems involving capacitors.

Content

- ✓ Electric field patterns
- ✓ Charge distribution on conductors :spherical and pear shaped conductors
- ✓ Action at points: lightning arrestors
- ✓ Capacitance: unit of capacitance(farad ,microfarad)factors affecting capacitance
- ✓ Applications of capacitors
- ✓ Problems involving capacitors (using $Q=CV, C_t=C_1+C_2$ $^1/_{ct}=^1/_{c1}+^1/_{c2}$)

Unit 4(Waves I and II,sound,electromagnetic spectrum)

Waves I

Specific objectives

By the end of the topic the learner should be able to:

a) Describe the formation of pulse and waves
b) Describe transverse and longitudinal waves
c) Define amplitude (a), wavelength(λ),frequency (f) and periodic time(T) of a wave
d) Derive the relation $v=f\lambda$
e) Solve numerical problems involving $v=f\lambda$

Content

- ✓ Pulse and waves
- ✓ Transverse and longitudinal waves
- ✓ Amplitude (a) ,wavelength(λ),frequency (f) and periodic time(t)
- ✓ Relation $v=f\lambda$
- ✓ Problems involving $v=f\lambda$

Waves II

Specific objectives

By the end of the topic the learner should be able to:

a) Describe experiment to illustrate the properties of waves
b) Sketch wave-fronts to illustrate the properties of waves
c) Explain constructive interference and destructive interference
d) Describe experiments to illustrate stationary waves

Content

- ✓ Properties of waves including sound waves,reflection,refraction,diffraction and interfence (experimental treatment required)
- ✓ Constructive interference and destructive interference(qualitative treatment only)
- ✓ Stationary waves(qualitative and experimental treatment only)

Sound

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe simple experiments to show that sound is produced by vibrating bodies
b) Perform and describe an experiment to show that sound requires a material medium for propagation
c) Explain the nature of sound waves
d) Determine the speed of sound in air by echo method
e) State the factors affecting the speed of sound
f) Solve numerical problems involving speed of sound

Content

- ✓ Sound :nature and source (experimental treatment
- ✓ Propagation of sound: compressions and rarefactions
- ✓ Speed of sound by echo method
- ✓ Factors affecting speed of sound
- ✓ Problems involving speed of sound

Electromagnetic spectrum

Specific objectives

By the end of the topic the learner should be able to:

a) Describe the complete electromagnetic spectrum
b) State the properties of electromagnetic waves
c) Describe the methods of detecting electromagnetic radiations
d) Describe the applications of electromagnetic radiations
e) Solve numerical problems involving $c=f\lambda$

Content

- ✓ Electromagnetic spectrum
- ✓ Properties of electromagnetic waves
- ✓ Detection of electromagnetic radiations
- ✓ Applications of electromagnetic radiations (include green house effect)
- ✓ Problems involving $c=f\lambda$

Unit 5(Magnetism,magnetic effect of electric current,electromagnetic induction)

Magnetism

Specific objectives

By the end of the topic the learner should be able to:

a) Describe the properties and use of magnets
b) Identify magnetic and non-magnetic materials
c) State the basic law of magnetism
d) Describe patterns of magnetic field
e) Describe methods of magnetization and demagnetization
f) Explain magnetization and demagnetization using the domain theory

g) Construct a simple compass

Content

- ✓ Magnets: properties and uses
- ✓ Magnetic and non-magnetic materials
- ✓ Basic law of magnetism
- ✓ Magnetic field patterns
- ✓ Magnetization and demagnetization
- ✓ Domain theory of magnetism
- ✓ Care of magnets
- ✓ Construction of simple magnetic compass

Magnetic effect of electric current

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe experiments to determine the direction of the magnetic field round a current carrying conductor
b) Construct a simple electromagnet
c) State the factors affecting the strength of an electromagnet
d) Determine experimentally the direction of a force on a conductor carrying current in a magnetic field(motor effect)
e) State the factors affecting force on a current carrying conductor in a magnetic field
f) Explain the working of simple electric motor and electric bell

Content

- ✓ Magnetic field due to a current
- ✓ Oersted's experiment
- ✓ Magnetic field patterns on straight conductor and solenoid(right hand grip rule)
- ✓ Simple electromagnets
- ✓ Factors affecting the strength of an electromagnet
- ✓ Motor effect (Fleming's left hand rule)
- ✓ Factors affecting force on a current carrying conductor in a magnetic field (qualitative treatment only)
- ✓ Applications-electric bell, simple electric motor

Electromagnetic induction

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe simple experiments to illustrate electromagnetic induction
b) State the factors affecting the magnitude and the direction of the induced e.m.f
c) State the laws of electromagnetic induction
d) Describe simple experiments to illustrate mutual induction
e) Explain the working of an alternating current(a.c) generator and direct current (d.c) generator
f) Explain the applications of electromagnetic induction
g) Solve numerical problems involving transformers

Content

- ✓ Simple experiments to illustrate electromagnetic induction
- ✓ Induced e.m.f –faradays law ,Lenz's law
- ✓ Mutual induction
- ✓ Alternating current(a.c) generator and direct current (d.c) generator
- ✓ Fleming's right hand –rule
- ✓ Transformers
- ✓ Applications of electromagnetic induction
- ✓ Problems involving transformers

Unit 6

(Photoelectric effect, X-rays, cathode rays, radioactivity and electronics)

Cathode rays and cathode ray tube

Specific objectives

By the end of the topic the learner should be able to:

a) Describe the production of cathode rays
b) State the properties of cathode rays
c) Explain the functioning of a cathode rays oscilloscope **(C.R.O)** and a television tube (TV tube)
d) Explain the use of a cathode ray oscilloscope
e) Solve numerical problems involving cathode rays oscilloscope

Content

- ✓ Production of cathode rays
- ✓ Properties of cathode rays
- ✓ C.R.O and TV tube
- ✓ Uses of CRO
- ✓ Problems involving CRO

X-rays

Specific objectives

By the end of the topic the learner should be able to:

a) Explain the production of x-rays
b) State the properties of x-rays
c) State the dangers of x-rays
d) Explain the uses of x-rays

Content

- ✓ Production of X-ray, X-ray tube
- ✓ Energy changes in an x-ray tube
- ✓ Properties of X-rays
- ✓ Soft and hard X-rays
- ✓ Dangers of X-rays and precautions
- ✓ Uses of X-rays (Bragg's law not required)

Photoelectric effect

Specific objectives

By the end of the topic the learner should be able to:

a) Perform and describe simple experiments to illustrate the photoelectric effect
b) Explain the factors that affect photoelectric emission
c) Apply the equation E =hf to calculate the energy of photons
d) Define threshold frequency, work function and electron volt
e) Explain photoelectric emission using Einstein equation($hf_o+{}^1/_2mv^2=hf$)
f) Explain the applications of photoelectric effect
g) Solve numerical problems involving photoelectric emissions

Content

- ✓ Photoelectric effect,photon,threshold frequency, work function, Planck's constant and electron volt
- ✓ Factors affecting photoelectric emission
- ✓ Energy of photons
- ✓ Einstein equation($hf_o+{}^1/_2mv^2=hf$)
- ✓ Applications of photoelectric effect-photo emissive cells, photo conductive cells, photovoltaic cells

Radioactivity

Specific objectives

By the end of the topic the learner should be able to:

a) Define radioactive decay and half life
b) Describe the three types of radiation emitted in natural radioactivity
c) Explain the detection of radioactive emissions
d) Define nuclear fission and fusion
e) Write balanced nuclear equations
f) Explain the dangers of radioactive emissions
g) State the applications of radioactivity
h) Solve numerical problems involving half-life

Content

- ✓ Radioactive decay
- ✓ half life
- ✓ Types of radiation, properties of radiations
- ✓ Detectors of radiations
- ✓ Nuclear fission and fusion
- ✓ Nuclear equations
- ✓ Hazards of radioactivity ,precautions
- ✓ Applications
- ✓ Problems of half-life(integration not required)

Electronics

Specific objectives

By the end of the topic the learner should be able to:

a) State the difference between conductors and insulators
b) Define intrinsic and extrinsic semi-conductors
c) Explain doping in semi-conductors
d) Explain the working of a p-n junction diode
e) Sketch current –voltage characteristic for a diode
f) Explain the application of diodes in rectification

Content

- ✓ Conductors,semi-conductors,insulators
- ✓ Intrinsic and extrinsic semi-conductors
- ✓ Doping
- ✓ P-n junction diode
- ✓ Application of diodes: half wave rectification and full wave rectification