

GOVERNMENT COLLEGE FOR WOMEN (AUTONOMOUS)

KUMBAKONAM

UG REVISED SYLLABUS 2015-2016 Batch

SEMESTER	COURSE TITTLE	TITTLE OF THE PAPER	INSTRU. HRS	CREDI T	MARKS
I	Part-I Language	Tamil	6	3	100
	Part-II Language	English	6	3	100
	Part- III Core Course- I	Properties of Matter & Sound	6	5	100
	Part- III Core Course- II	Major Practical I	3	-	-
	Part- III – Allied Course -I	Maths	6	4	100
	Part- III – Allied Course -II	Maths	3	-	-
	TOTAL		30	15	400
II	Part-I Language	Tamil	6	3	100
	Part-II Language	English	6	3	100
	Part- III Core Course- II	Major Practical I	3	5	100
	Part- III Core Course- III	Mechanics	5	5	100
	Part- III – Allied Course -II	Maths	2	3	100
	Part- III – Allied Course - III	Maths	4	3	100
		Value Education	2	2	100
		Environmental Studies	2	2	100
	TOTAL		30	26	800
III	Part-I Language	Tamil	6	3	100
	Part-II Language	English	6	3	100
	Part- III Core Course- IV	Thermal Physics	6	5	100
	Part- III Core Course- V	Major Practical-II	3	-	-
	Part- III – Allied Course - IV	Chemistry	5	4	100
	Part- III – Allied Course -V	Allied Practical	2	-	-
	Part-Iv- Non – Major Elective Course	Bio – Medical Instrumentation	2	2	100
	TOTAL		30	17	500

SEMESTER	COURSE TITLE	TITLE OF THE PAPER	INSTR U. HRS	CREDIT	MARKS
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IV	Part-I Language	Tamil	6	3	100
	Part-II Language	English	6	3	100
	Part- III Core Course- V	Major Practical-II	2	4	100
	Part- III Core Course- VI	Optics	5	4	100
	Part- III – Allied Course –V	Chemistry Practical	3	3	100
	Part- III – Allied Course -VI	Chemistry	4	3	100
	Part –IV	Non-Major Elective Course	2	2	100
	Part-IV	Skill Based Elective Course -I	2	4	100
	TOTAL		30	26	800
V	Core Course- VII	Electricity And Magnetism	6	5	100
	Core Course- VIII	Atomic Physics	5	4	100
	Core Course- IX	Basic Electronics	5	4	100
	Core Course- X	Major Practical	5	4	100
	Major Based Elective- I	Spectroscopy And Laser Physics	5	5	100
	Part-IV	Skill Based Elective Course -II	2	4	100
	Part-IV	Skill Based Elective Course -III	2	4	100
	TOTAL		30	30	700
VI	Core Course- XI	Wave Mechanics & Nuclear Physics	6	5	100
	Core Course- XII	Solid State Physics	6	5	100
	Core Course- XIII	Major Practical	6	5	100
	Major Based Elective- II	Integrated Electronics	5	5	100
	Major Based Elective- III	Computer Programming-C Language	6	4	100
	Extension Activities	-	-	1	-
	Gender Studies		1	1	100
	TOTAL		30	26	600

Total No of Papers : 38

Total Hours : 180

Credit : 139

Extension Activities : 1

Marks : 3800

B.Sc., PHYSICS SYLLABUS

CCI: PROPERTIES OF MATTER AND SOUND

UNIT - I: ELASTICITY

Stress – Strain diagram – Elastic moduli, work done per unit volume in shearing – Relation between elastic constants –Poisson's Ratio – Expression for Poisson's Ratio in terms of elastic constants –Twisting couple on a wire – Work done in twisting – Torsional pendulum –determination of rigidity modulus of a wire.

UNIT – II: BENDING OF BEAMS:

Expression for bending moment- Cantilever- Expression for depression- Experiment to find Young's modulus- Cantilever oscillation- Expression for period – Uniform bending- Expression for elevation- Experiment to find Young's modulus using microscope – Non Uniform bending – Expression for depression – Experiment to determine Young's modulus using mirror and telescope.

UNIT –IIIa: SURFACE TENSION:

Definition and dimensions of surface tension – surface energy – Excess of pressure over curved surfaces- Variation of surface tension with temperature – Jagar's experiment – Determination of surface tension by capillary rise method.

UNIT –IIIb : LOW PRESSURE:

Production and measurement of low pressure – Gaede's molecular pump – Kundsen's absolute gauge – Detection of leakage.

UNIT-IV: VISCOSITY

Streamlined motion – turbulent motion – coefficient of viscosity and its dimension –Rate of flow of liquid in a capillary tube – Poiseuille's formula – experiment to determine the coefficient of viscosity of liquid – Terminal velocity- stoke's experiment .

UNIT-V:SOUND:

Free and damped oscillations- origin of sound- Material medium- Velocity of longitudinal waves in gases- Newton's formula for velocity of sound- Effect of pressure, temperature, density of medium-wind and humidity- velocity of sound in water,air-Beats-Helmholtz resonator-velocity of transverse waves in strings- Reverberation time-Sabine's formula.

Books for study:

- A. Properties of matter – Brijlal and Subramanian
- B. A text book of sound – N. Subramanian and brijlal

Book for reference:

- C. Properties of matter – D.S Mathur
- D. Properties of matter – SubramaniaIyer and Jeyaraman
- E. Oscillations, waves and sound – L.Sharma, H.C.saxena
- F. A Text book of sound – R.L. Singal

CC-II MAJOR PRACTICALS - I

(Any Twelve Experiments only)

- 1.Non-uniform bending-pin and Microscope

2. Uniform bending- Single Optic fiber
3. Surface tension-Capillary rise method
4. Determination of RD of solid and liquid using sonometer
5. Melde's experiment-Transverse and longitudinal mode of vibration
6. Compound Pendulum-g and k
7. Cantilever depression-scale and telescope
8. Specific heat capacity of a liquid-Newton's Law of cooling
9. Thermal conductivity of a bad conductor-Lee's disc
10. Long focus convex lens-f,R, μ
11. Concave lens-r,R, μ
12. Newton's Rings- 'R' determination
13. Spectrometer- μ of a solid prism
14. Air wedge thickness of insulation
15. P.O.Box-Temperature coefficient of the given coil
16. Viscosity-Poiseuille's flow of method
17. Surface Tension-Drop Weight Method.
18. Surface tension Interfacial method.(Drop weight Method)

CC-III-MECHANICS:

UNIT-I: DYNAMICS PROJECTILE, IMPULSE, IMPACT:

Projectile – range of horizontal and inclined plane- Impact_ Impulsive force – Laws of impact _ Impact of a smooth sphere on a smooth horizontal plane – Direct and oblique impact-Loss in kinetic energy-Motion of two interacting bodies-Reduced mass.

UNIT-II:DYNAMICS OF RIGID BODIES

Kinetic energy of rotation-Theory of Compound Pendulum-Equivalent simple pendulum-Reversibility of centre of oscillation and suspension-Determination of g and radius of gyration of a bar pendulum-Period of oscillation of Bifilar pendulum with and without parallel threads.Centre of mass-Velocity and acceleration of centre of mass-determination of motion of individual particles-system of variable mass-equation for Rocket-Conservation of linear momentum and angular momentum.

UNIT:III GRAVITATION AND CENTRE OF GRAVITY

Gravitational potential and field due to spherical shell-Gravitational energy-Boyer's method of G -Centre of gravity of a solid and hollow tetrahedron,solid and hollow hemisphere-Stability-Types of Equilibrium-Banking of curves.

UNIT:IV:CENTRE OF PRESSURE

Vertical rectangular lamina –Vertical triangular lamina-Vertical circular lamina-Atmospheric pressure-its variation with altitude-Reasons for such variation.

HYDRODYNAMICS:

Equation of continuity of flow-Euler's equation for unidirectional flow-applications-Bernoulli's theorem - Torricelli's theorem.

UNIT-V:RELATIVITY:

Galilean-Newtonian relativity, Galilean transformations- Michelson Morley experiment and its importance- Einstein's postulates- Lorentz transformations and its interpretation-Consequences of Lorentz transformations- Length contraction, time dilation-relativistic addition of velocities-Mass-energy equivalence- Basic idea of general theory of relativity.

Books for study:

1. Mechanics- part-I&II Narayanamoorthy.
2. Classical Mechanics-Gupta, Kumar and Sharma.
3. Statistical mechanics-SathyaPrakash and C.Agarwal.

Books for Reference:

- 1.Mechanics-D.S.Mathur
2. Elementary statistical mechanics-GuptaKumar
- 3.Classical Mechanics-H. Goldstein.

CC IV : THERMAL AND STATISTICAL PHYSICS

Unit I: Thermodynamics

Zeroth law of thermodynamics –First law of thermodynamics-Work done in an isothermal and adiabatic processes-Heat engines-Reversible and irreversible processes-isobaric, isochoric process-Carnot's theorem-Second law of thermodynamics-Thermodynamic scale of temperature- Maxwell's Thermodynamical relations-derivations.

UNIT:II ENTROPY

- (a) Entropy-change in entropy in reversible and irreversible processes-temperature –entropy diagram- Clausius-Clayperon equation-Enthalpy-Nernst heat theorem.
- (b) Thermal conductivity –forbe's method Lee's disc method-Thermal conductivity of glass and rubber.

UNIT:III LOW TEMPERATURE

Joule-Thomson's effect-Porous plug experiment-Liquefaction of gases(air, H₂ and He) Adiabatic expansion process-Adiabatic demagnetization-Practical application of low temperature-Refrigerating machine-Electrolux refrigerator-Air conditioning machine.

UNIT:IV RADIATION

Blackbody radiation-Stefan's law-Boltzmann law-Blackbody-Rayleigh radiation-Rayleigh-Jeans law-Wien's displacement law-Planck's law-Stefan's fourth power law-Pyrometry-Solar constant-sources of solar energy.

UNIT:V STATISTICAL PHYSICS

Phase space-Maxwell-Boltzmann distribution law-Fermi Dirac distribution law-Application to electron gas-Bose-Einstein distribution law-Application to photon gas-Radiation Laws-Comparison of three Statistics.

BOOKS FOR STUDY:

Heat and Thermodynamics - Brijlal & Subramaniam

Heat and Thermodynamics – J.B. Raju & C.L. Arora

Statistical mechanics Satyaprakash & C. Agarwal

BOOKS FOR REFERENCE:

Thermodynamics and Statistical physics – Sharma & Sarkar

CC V : MAJOR PRACTICAL II

1. Static Torsion –Determination of n
2. Torsional pendulum –Determination of n and I
3. Stokes method –Determination of viscosity of highly viscous liquid
4. Comparison of viscosity-Poiseuill's Flow method
5. Spherical calorimeter-Determination of Emissive power of a surface
6. Joule's calorimeter-Determination of specific heat capacity of liquid
7. Carey foster's Bridge-Determination of resistance and specific resistance.
8. Carey foster's Bridge-Determination of Temperature co efficient of resistance
9. Potentiometer-Calibration of Ammeter
10. Potentiometer-Calibration of low range voltmeter
11. Potentiometer-Calibration high range voltmeter
12. Potentiometer-Determination of Temperature coefficient of resistance
13. Aperiodic Galvanometer-Figure of merit
14. Spectrometer-Determination of Refractive index of a liquid.
15. Spectrometer-Grating-Determination of ' λ ' Normal Incidence method
16. Newton's rings-Determination of Refractive index of a liquid
17. Koenig's method-Determination of Young's modulus of a given material

CC VI : OPTICS

CODE :

CREDITS:

Unit I: Aberration in Lenses

Spherical aberration - aberration of a thin lens – Methods of Reducing spherical aberration – Chromatic aberration – Condition for achromatism of lenses – Coma – Astigmatism – Curvature of the field.

Unit II : Optical instruments

Ramsden's eyepiece – Huygen's eyepiece – Resolving power – Rayleigh's criterion of Resolution – Resolving power of a (1) Telescope (2) Microscope (3) Prism (4) Grating Optical Fibre – Construction – Derivation of Numerical aperture – Optical fibre communication system with block diagram-Fibre optic Sensor

Unit III : Interference

Principle of superposition – Coherent sources – Colours of thin films – Air wedge – Newton's rings – Brewster's fringes – Michelson interferometer and its applications (measurement of wavelength and difference between wavelengths of two close lines) –Haidinger's fringes – Fabry Perrot interferometer.

Unit IV : Diffraction

Fresnel's diffraction – Diffraction at a (1) circular aperture (2) opaque circular disc –(3) Straight edge (4) Narrow wire – Fraunhofer diffraction at a single slit – Double slit – Grating with theory – Oblique incidence – Overlapping of Spectral lines.

Unit V : Polarization

Polarization by reflection – Refraction – Principle section – Principle – plane – Brewster's law – Malu's law – Nicol prism – Nicol prism as an analyzer and polariser – Optical activity –Fresnel's explanation of optical activity.

Books for study:

Textbook of optics Brijal & Subramaniam

Optics Khanna & Gulati

Optics Gosakan

Optics R.Murugesan

Books for reference:

Optics Jenkins & White

Optics Ajoy Ghatak.

ALLIED PHYSICS – I

UNIT I: PROPERTIES OF MATTER AND SOUND

Elasticity-Elastic constants relation-Bending of beams-Young's modulus by Non uniform bending-Determination of rigidity modulus by torsional pendulum-Static torsion-Viscosity-Co-efficient of viscosity-Poisson's Formula-Comparison of viscosities-Burette method.

UNIT II: SOUND

Simple Harmonic Motion-Composition of two S.H.M along a straight line & at right angles-Lissajous figures-Demonstration of Lissajous figures -uses.Ultrasonic-production of ultrasonic waves-Magnetostriction,Piezoelectric oscillator-Properties, Application of Ultrasonic waves-Acoustic of buildings-Reverberation and reverberation time-Factors affecting the acoustics of Buildings-Requisites for good auditorium-Decibel-Phone-Intensity measurement by microphone method.

UNIT III:MECHANICS

Introduction to center of gravity-Center of gravity of a solid hemisphere-hollow hemisphere and solid cone.

Floatation-Stability of floating bodies-Metacentre-Determination of metacentric height of a ship.

UNIT IV: THERMAL PHYSICS

Newton's law of cooling-Verification-Specific heat capacity of a liquid by cooling –Bomb calorimeter.

Conduction-Co-efficient of thermal conductivity-Good and bad conductors-Radiation-Black body-Stefan's law of radiation-Solar constant-Angstrom's Pyro heliometer-Surface temperature of the sun.

UNIT V: OPTICS AND SPECTROSCOPY

Electromagnetic spectrum-Types of spectra-Absorption & Emission spectra-Spectral response of human eye-Raman effect-Theory experimental arrangement-Application of Raman effect.

Introduction to fiber optic communication-Optic fiber-Numerical Aperture-Fiber Optical communication(Block Diagram) Systems and its advantage-Step and graded index fiber-Temperature & Displacement sensor.

BOOKS FOR STUDY

Properties of matter -R.Murugesan

Mechanics – Narayanamoorthy

Heat and thermodynamics – Brijilal&Subramaniam

Sound – Brijilal&Subramaniam

Optics - Brijilal&Subramaniam

Fiber optics - Subirkumarsarkar

Allied physics – R.Murugesan

Allied Physics – Sundaravelusamy

ALLIED PHYSICS PRACTICAL-II

CODE:

CREDITS:

1. Young's modulus-non-uniform bending-pin and microscope method
2. Surface tension-Drop weight method
3. Interfacial surface tension-Drop weight method
4. Viscosity-Graduated burette method
5. Sonometer-Verification of laws
6. Spectrometer-Refractive index of a solid prism
7. Spectrometer-Grating-Normal incidence method
8. Newton's Ring-Radius of curvature
9. Air wedge-Thickness of the material
10. Newton's LAW OF COOLING-Specific heat capacity of a given liquid
11. Lee's disc-Thermal conductivity of a bad conductor
12. EMF of a Thermocouple-Direct deflection method
13. Carey foster's Bridge-Specific resistance
14. Carey foster's Bridge-VERIFICATION OF LAWS OF SERIES AND PARALLEL
15. Meter Bridge-Specific resistance
16. Meter Bridge-Verification of laws of series and parallel
17. Aperiodic galvanometer-figure of merit
18. Junction diode characteristics
19. Zener diode characteristics
20. Logic gates using discrete components

ALLIED PHYSICS-III

CODE:

CREDITS:

UNIT I:ELECTRICITY AND MAGNETISM

Capacitor-Principle of a capacitor-Capacity of isolated spherical, cylindrical capacitor-Energy of charged capacitors-Sharing of charges and loss of energy. Magnetic field due to a current carrying conductor-Oersted Experiment-Maxwell's cork screw rule-Biot-Savart's law-Field along the axis of a circular coil-Force in a conductor carrying current in a magnetic field –Ballistic galvanometer-Principle Construction and Theory.

UNIT II:ATOMIC PHYSICS

Introduction to Atom model-Vector atom model-Spatial quantization, spinning of electron-quantum numbers-Pauli's exclusion principle-Stern & Gerlack Experiment X-ray-production of X-rays-Continuous and characteristic z-ray-Mosley's law and its importance-Bragg's law-Miller indices

UNIT III:NUCLEAR PHYSICS

Nuclear model-Liquid drop model-Nuclear energy-Mass defect-Binding energy-Radioactivity-Nature of Alpha, Beta and Gamma rays-Exponential law-Half life period-Mean life period.

Fission and Fusion-ATOM BOMB-Hydrogen bomb –Nuclear reactor-Thermonuclear reactions-Source of solar energy.

UNIT IV: BASIC ELECTRONICS

Semiconductors-Types Junction diode-Biasing-Characteristics-Zener diode Characteristics-

Voltage regulator. Junction transistors-Working-Circuit configuration-CB and CE mode-Characteristics-Transistor Biasing-Voltage divider method –CE transistor-Amplifier (single stage).

UNIT V:DIGITAL ELECTRONICS

Number system-Decimal, Binary, Octal, Hexadecimal and inter conversion-AND, OR, NOT gates-Construction using diodes and transistors. NAND and NOR gates-Universal building blocks –Boolean algebra-Demorgan's theorem-Verification.

BOOKS FOR STUDY:

Electricity and Magnetism Brijlal and Subramaniyam

Modern physics R. Murugesan

Nuclear Physics D.C. Tayal

Principle of Electronics V.K. Mehta

Allied Physics R. Murugesan

Allied Physics-II Sundaravelusamy

Digital Principle and application Malvino and Leach

APPLIED PHYSICS – I

UNIT I: ELECTROSTATICS

Gauss theorem and its applications-intensity due to charged sphere-capacitor-Principle of capacitor-Capacitors in series and parallel-Energy of a charged capacitor-Loss of energy due to the sharing of charge.

UNIT II: MAGNETOSTATICS

Magnetic field-Magnetic flux density-Magnetization-Permeability-Susceptibility-Relation between them-Magnetic potential-Properties of Dia, Para and Ferromagnetic Materials-Hysteresis-B-H Curve using Ballistic Galvanometer.

UNIT III: CURRENT ELECTRICITY

Laplace's law-Magnetic field intensity at a point due to a straight conductor carrying current-Circular coil-Solenoid-Force between two parallel conductors-Kirchhoff's law-Wheatstone's bridge-Carey Foster's bridge-Potentiometer-Measurement of current-Fleming's left hand rule-Ballistic Galvanometer-Construction theory.

UNIT IV: ELECTROMAGNETIC INDUCTION

Introduction-Laws of electromagnetic induction-Eddy current-determination of self-inductance-Anderson's method-Coefficient of Mutual induction-Determination –Coefficient of coupling Transformer theory.

UNIT V: ALTERNATING CURRENT

AC circuits with double components-Measurements of current and voltage-Power in an AC circuit-Power factor derivation-Wattless current-Choke-Series and Parallel resonance circuits-Oscillatory discharge of a condenser-AC&DC circuits-Growth and decay of current in an LR and CR circuit.

BOOKS FOR STUDY

Electricity and Magnetism - Brijilal&Subramaniam

Electricity and Magnetism- D.L.Seghal and Chopra

Electricity and Magnetism- R.Murugesan

Electricity and Magnetism – M.Narayanamurthi and N.Nagaratnam

Applied physics –I -Sundaravelusamy

APPLIED PHYSICS-II-PRACTICAL

1. Semiconductor Diode-Characteristics
2. Zener diode-Characteristics
3. FET Characteristics
4. Transistor Characteristics in CE mode
5. Transistor Characteristics in CB mode
6. Bridge rectifier and Zener controlled Regulated power Supply
7. Field along the axis of a coil-M and H
8. Potentiometer-Measurement of resistance
9. Potentiometer-Measurement of current
10. Carey Foster's bridge-Specific resistance
11. Calibration of a thermistor and determination of its energy gap
12. Series resonance circuits
13. Single stage amplifier
14. FET Amplifier
15. Astable multivibrator
16. Mathematical operators-Addition, subtraction using Op-amp
17. Printed circuit board design

APPLIED PHYSICS-III

CODE:

CREDITS:

UNIT I: SEMICONDUCTOR PHYSICS

Theory of energy bands in crystals-Distinction between conductors, insulators and semiconductors-Intrinsic and Extrinsic semiconductors-Hall effect in semiconductor-Junction diode-Zener diode-Tunnel diode.

UNIT II: TRANSISTORS

PNP and NPN Transistors-DC characteristics of CE and CB configuration-Hybrid parameters-Only equation-Functions of transistors as an amplifier and oscillator-FET-Construction and Working-Characteristics of FET amplifier.

UNIT III: OPERATIONAL AMPLIFIERS

Basic Op-amp-Inverting and Non-inverting Op-amp-Differential Op-amp-CMRR-Basic uses of Op-amp as sign and scale changer, phase shifter-Integrator-Differentiator-Adder-A/D conversion-Counter methods –Op-amp as a comparator.

UNIT IV :DIGITAL LOGIC CIRCUITS

Logic gates (AND, OR, NOT, XOR ONLY)-Boolean algebra-Demorgan's Theorem-Karnaugh map simplification-two variable-SOP-Encoder-Decoder-Half Adder and Half Sub tractor –RS Flip flop.

UNIT V: DIGITAL COMPONENTS

Integrated circuits-Fabrication of diode and transistor-Decoders (Basic circuit 2 into 1) –Multiplexers(Basic circuit 1 into 4)-Shift right and shift left registers.

BOOKS FOR STUDY:

The fundamentals of solid state physics Theraja
Digital principles and applications Malvino&leach
Digital logic and computer design Morris and Mano
Electronic devices and circuits Milman&Halkias

CC VII : ELECTRICITY AND MAGNETISM

CODE:

CREDITS:

UNIT I : ELECTROSTATICS

Gauss theorem and applications-Electric field due to a uniformly charged Sphere-Electric field due to charged spherical and Cylinder-Capacitor-Parallel plate capacitor-Cylindrical Capacitor- Spherical Capacitor- Energy Stored in a Capacitor – Loss of Energy Stored in a Capacitor – Loss of Energy on sharing of Charges.

UNIT II : MAGNETIC PROPERTIES OF MATERIALS

Basic definitions – Electron theory of magnetism – Dia, Para, Ferro magnetic materials –Hysteresis – B-H curve using Ballistic Galvanometer – Energy loss due hysteresis and its importance.

UNIT III : CURRENT ELECTRICITY

Meter bridge – Construction & Working – Potentiometer – Calibration of ammeter-Calibration of low range voltmeter- \ - Carey foster's bridge – Theory – Determination Of Specific resistance of the material of the unknown coil – Thermoelectricity – peltier And Thomson coefficients – Application of thermodynamic to a thermocouple – Thermoelectric diagram – Determination of Peltier and Thomson coefficients.

UNIT IV : ELECTROMAGNETIC INDUCTION

Laws of electromagnetic induction – Self induction – Rayleigh's methods – Mutual Induction – experimental determination of mutual induction – AC and DC circuits – Growth and decay of current in an LR circuit – Growth and decay of charge in a CR Circuit – Series and Parallel Resonance circuits applied with AC – Sharpness of Resonance – Power factor.

UNIT V : MAGNETIC EFFECTS OF CURRENT

Biot- Savart's law – Force due to charged conductor - Force between two parallel Conductors – Magnetic intensity due to straight conductor , circular coil and solenoid – Theory of ballistic galvanometers – Damping correction – Conversion of galvanometer Into voltmeters and ammeter – ohm meters and multimeter.

BOOKS FOR STUDY:

- 1.Electricity and magnetism Brijlal and Subramaniam
- 2.Electricity and magnetism K.K . Tewarai
3. Electricity and magnetism R..Murugesan
4. Electricity and magnetism M.Narayanamurthi and N. Nagarathinam
5. Electricity and magnetism D.L.Seghal an.

CC VIII : ATOMIC PHYSICS

CODE:

CREDITS:

UNIT I: POSITIVE RAY ANALYSIS

Properties of positive rays-e/m of positive rays – Thomson’s parabola method – Aston’s method – Bainbridge’s method – Franck and Hertz’s experiment – Determination of critical potential.

UNIT II: PHOTO ELECTRICITY

Photoelectric emission – Laws –Lenard’s experiment – Richadson & Compton experiment – Einstein’s photoelectric equation –Experimental verification of Einstein’s photoelectric equation by Millikan’s experiment – Photoelectric cells – photo emissive photoconductive, photovoltaic cells – Application.

UNIT III : VECTOR ATOM MODEL

Salient features of Vector atom model-Various quantum numbers-L-S and j-j couplings-Pauli’s exclusion principle – Electronic configuration of elements and periodic classification – Magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton –Stern and Gerlach experiment.

UNIT IV : ATOMATIC SEPCTRA

Spectral terms and notations – Selection rules – Intensity rule and interval rule – Fine structure of sodium D lines – Alkali spectra – Fine structure in alkali spectra – Zeeman Effect – Larmor’s theorem – Debye’s quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – Theoretical explanation – Lande’s g factor and Paschen Back effect and stark effect.

UNIT V : X-RAYS

X-rays – Bragg’s law – Bragg’s X-ray Spectrometer – Origin and analysis of continuous X-rays spectrum – Characteristics X-ray spectrum – Mosley’s law and its importance – Compton effect – Derivation of expression for change in wavelength – its experimental verification.

BOOKS FOR STUDY:

1. Modern physics R.Murugesan
2. Modern Physics J.B.Rajam

BOOKS FOR REFERANCE:

1. Atomic and Nuclear Physics Brijlal and Subramanyam

CC IX: BASIC ELECTRONICS

CODE:

CREDITS:

UNIT I: SEMICONDUCTORS AND TRANSISTORS

Biasing of p-n Junction-Characteristics of a Zener diode-Voltage Regulator. Junction Transistors in Common Base and Common Emitter mode-Load line-Operating point-Transistor biasing-Voltage divider method-Hybrid Parameters-Two Port network-Determinations of h-Parameters.

UNIT II: AMPLIFIERS

Transistor as non amplifiers-Lord lind analysis-Analysis of CE amplifier using hybrid parameters-Power amplifier classification-Class A Power amplifier, Transformers coupled-Class B Push pull amplifier-RC Coupled amplifier-Frequency response-Emitter follower-feedback-Negative feedback amplifiers.

UNIT III: OSCILLATOR AND SWITCHING CIRCUITS

Barkhausen criterion for oscillations-Transistor as an oscillator-Working of Tuned collector, Hartley and colpitt's oscillators-Calculation of frequency of oscillation-Multivibrators-Astable, Monostable and Bistable.

UNIT IV: OPERATIONAL AMPLIFIERS

Characteristics-Inverting amplifier-Non-inverting amplifier n-Adders-Subtractor –Differentiator-Integrator-Op-amp as low, high and band pass filters- Solving differential equations –first and second orders only

UNIT V: SPECIAL SEMICONDUCTOR DEVICES

FET-Working-Difference between FET and Transistor-Advantages of FET-Characteristics of FET-MOSFET-Working-SCR-Working-Characteristics-SCR as switch-UJT-Working-Characteristics-Application as relaxation oscillator.

BOOKS FOR STUDY:

1. Modern Physics R. Murugesan
2. Principle of Electronics V.K. Mehta
3. Electronics(Minnanuvial) Sundaravelusamy
4. Handbook of Electronics Gupta and Kumar
5. Solid State Electronics B.L. Theraja
6. A Textbook of Applied Electronics R.S. Sedha
7. Elements of Electronics Badge &Singh

CC X : MAJOR PRACTICAL-III

SECTION-A(Any 12 Experiments)

1. Spectrometer-i-d curve
2. Spectrometer-i-i' curve
3. Spectrometer-Dispersive power of a prism-Mercury Spectrum
4. Spectrometer – Small angled prism
5. Spectrometer – Grating-Normal incidence method-Dispersive power
6. Spectrometer – Grating- minimum deviation method –Dispersive power
7. Spectrometer – Cauchy's constants
8. Spectrometer – Hartmann's constants
9. Field along the axis of a coil – Determination of magnetic moment
10. M and H – Absolute determination using deflection and vibration magnetometer.
11. Potentiometer – Specific resistance
12. Potentiometer – EMF of a thermocouple
13. Potentiometer – Resistance of thermistor
14. Potentiometer – Comparison of EMF's
15. Thermistor – Energy gap
16. Spot galvanometer – Figure of merit
17. Spot galvanometer – Comparison of EMF's

SECTION – B (Any 3 Experiments)

18. Finding the largest and Smallest number
19. Sorting a set of numbers in ascending and descending order
20. Solving Quadratic equations
21. Addition and Subtraction of two matrices
22. Multiplication of two matrices
23. Solving equation by Newton – Raphson methods

MAJOE BASED ELECTIVE I :SPECTROSCOPY AND LASER PHYSICS

CODE:

CREDITS:

UNIT I:SPECTROSCOPY

Definition of spectrum- Electromagnetic radiation- interaction of electromagnetic radiation with molecules – Type of spectra – Emission spectra- Absorption spectra-Fraunhofer line-Molecular spectroscopy- Quantization of different forms of energies in molecules.

UNIT II: MICROWAVE SPECTROSCOPY

Rotation of molecule and its spectra-Rigid rotator and its spectrum-Linear, Symmetric top molecules- Microwaves Spectrometer.

UNIT III: INFRARED SPECTROSCOPY

Vibration of diatomic molecule-Energy of diatomic molecule-Harmonic oscillator-Anharmonic oscillator- Diatomic vibrating rotator-Interaction between rotation and vibrations-Double beam spectrometer.

UNIT IV: RAMAN SPECTROSCOPY

Theory of Raman effect-Pure rotational spectra-linear, symmetric top molecules-Pure vibrational spectra-Raman activity of vibration-Structural determination from Raman and IR spectroscopy-Raman Spectrometer.

UNIT V: LASER PHYSICS

Population inversion-pumping processes-Threshold condition-Quantum yield-Three level system-ruby laser –pumping power-four level laser-CO₂ laser-Nd –YAG laser-He-Ne laser.

BOOK FOR STUDY

1. Fundamental of molecular spectroscopy C.N. Banwell
2. Elements of spectroscopy Gupta Kumar Sharma

BOOK REFERENCE

1. Elements of spectroscopy Chatwell-Anand
2. Molecular spectroscopy P.R. Singh-S.K. Dikshit

CC IX :WAVE MECHANICS AND NUCLEAR PHYSICS

CODE:

CREDITS:

UNIT I:DUALITY

Dual nature-De Broglie waves-Wave packet, phase and group velocities-Davisson-Germer experiment-G.P. Thomson experiment – Gamma ray microscope-Uncertainty principle-Non-existence of electron inside the nucleus.

UNIT II: WAVE MECHANICS

Wave function for a free particle-Time independent and Time dependent Schrodinger equation-Physical significance of wave function-Operators-Eigen value and Eigen function-Postulates-Probability current density-Normalization of wave function-Expectation values-Applications of Schrodinger equation-Free particles-particle in one-dimensional box-One dimensional linear harmonic oscillator.

UNIT III: NUCLEAR PHYSICS

Basic properties of nuclei-Nuclear size, mass density, radius, charge and spin-Mass defect- Binding energy-Packing fraction-Magnetic moments of nucleus-Rutherford's scattering experiment-Radioactivity-Properties of α , β , γ rays Soddy Frenkel's Law- Radioactive equilibrium-Laws of successive disintegration –Half-Life –Mean Life Cyclotron-Betatron-Linear accelerator-Geiger Muller Counter.

UNIT IV: NUCLEAR MODELS

Liquid drop model-Application to fission-Shell model-Magic numbers-Spin-Orbit coupling-Nuclear reactions-Types-Q-value of nuclear reaction-Nuclear energy –Nuclear fission-Atom bomb-Nuclear fusion-Thermonuclear reactions-Hydrogen bomb-Basic ideas of cold fusion.

UNIT V: ELEMENTARY PARTICLES

Classification of elementary particles-Particles and antiparticles-Leptons-Mesons-Baryons-Strange particles-Hyperons-Conservation laws-Fundamental interactions-Basic ideas of Quarks.

BOOKS FOR STUDY:

1. Modern Physics R. Murugesan
2. Nuclear Physics D.C. Tayal
3. Nuclear Physics (Anukkaruiyarpial) Sundaravelusamy
4. Concepts of Modern Physics Arthur Beiser
5. Fundamentals of Modern Physics Duggal and Chopra
6. Modern Physics J.B. Rajam
7. Atomic and Nuclear Physics Brijlal and Subramanyam
8. An Introduction to Modern Physics P. Mahendru
9. Quantum mechanics Bagde & Singh

CC XII : SOLID STATE PHYSICS

CODE:

CREDITS:

UNIT I: CRYSTAL STRUCTURE AND DEFECTS

Crystal lattice – Primitive and unit cell – Seven Classes of Crystals – Bravais lattice – Miller indices – Reciprocal lattice – Structure of Simple Cubic, Body Centred Cubic, Face Centred Cubic Crystals – Lattice defects – Point, Line, Surface and planar defects – Colourcenters – (F &V).

UNIT II: DIELECTRICS

Fundamental definition in dielectrics- Clausius-Mossotti equation-Types of polarizability-Temperature dependence and study of molecular structure-Frequency response-Dielectric loss and study of molecular structure-Basic ideas of ferroelectricity-Application of Ferro electronic crystals.

UNIT III: MAGNETISM

Different types of magnetic materials-Langevin's theory of Diamagnetism-Weiss theory of

Para magnetism-Spontaneous magnetization in a Ferro magnet – Weiss theory of ferromagnetism- Temperature dependence-Weiss molecular field theory-Domain structure- Hysteresis-Basic ideas of antiferromagnetism-Soft and Hard magnetic materials.

UNIT IV: SUPERCONDUCTORS

Effect of magnetic field –Meissner effect-Persistent current-Types of superconductors –Intermediate state-Entropy-Specific heat capacity-Thermal conductivity-Penetration depth-London equation's-AC and DC Josephson effects BCS theory(qualitative).

UNIT V: MODERN ENGINEERING MATERIALS

Definition, Properties & Application of Polymer-Ceramics-Electrets-Ceramics-Nuclear engineering materials – Thermoelectric material-Nanomaterial-Metallic Glasses-Fiber Reinforced Plastics-Metal Matrix Composites-High Temperature Materials.

BOOKS FOR STUDY

1. Material Science M.Arumugam
2. Solid state Physics Gupta Kumar Sharma

BOOK FOR REFERENCE

1. Introduction to Solid state physics Kittel
2. Material Science and Engineering V. Raghavan
3. Introduction to Solids Azaroff-TMH

CC XIII : MAJOR PRACTICAL –IV

SECTION – A (Electronics)

(Any 12 Experiments)

1. Series and Parallel resonant circuits.
2. Junction diode and Zener diode- Characteristics
3. Transistor characteristics in CE mode
4. Zener regulated Powers Supply – Percentage of regulation
5. Semiconductor diodes – Voltage Doubler and Tripler
6. Single Stage RC coupled amplifier – Transistor
7. Hartley oscillator –Transistor
8. Colpitt's oscillator –Transistor
9. Astablemultivibrator – Transistor
10. Monostablemultivibrator – Transistor
11. FET Characteristics
12. .Logic gates – AND, OR and NOT Gates using discrete components – Verification of truth table
13. NAND, NOR gates using discrete components – Verification of truth table
14. Verification of De Morgan's theorem
15. Universal gates NAND/NOR and Basic gates from Universal Gates (ICs) – Verification of truth table
16. Half adder and Half subtractor

SECTION – B (Using 8085 Microprocessor)

(Any 3 Experiments)

17. 8-bit addition and 8-bit subtraction
18. 8-bit multiplication and 8-bit division
19. Conversion from Decimal to Hexadecimal system
20. Conversion from Hexadecimal to Decimal system
21. 16-bit addition

MAJOR BASED ELECTIVE II : INTEGRATED ELECTRONICS

CODE:

CREDITS:

UNIT I: BINARY LOGIC

Decimal, Binary, Octal, Hexadecimal number system and interconversion- Binary addition and subtraction—BCD CODE-Excess 3 code-Gray code- Laws of Boolean algebra-Demorgan's theorems-Logic gates-Universal gates- Minterms and maxterms –Karnugh map (upto four variables-SOP only).

UNIT II: INTERGRATED CIRCUITS

Fabrication of basic monolithic integrated circuits using different steps – Integrated diode, transistor, registers and capacitors – Advantages and limitations of integrated circuits – SSI, MSI LSI – Basic ideas.

UNIT III: COMBINATIONAL AND SEQUENTIAL LOGIC

Half and full adder – Half and sub tractor – BCD to 7 segment Decoder – Decimal to BCD encoder – 4:1 Multiplexer – 1:4 Demultiplexer – RS flip Flop – Clocked RS flip flop – JK flip flop – Shift registers.

UNIT IV: SEMICONDUCTOR MEMOTIES

Basics – ROM – PROM – EPROM –RAM – DRAMS – Memory addressing memory cells – CAM – CCD.

UNIT V: MICROPROCESSOR

Architecture of 8085 - Buses – Pin configuration – Microprocessor Programming – Machine language – Assembly language – Addressing modes – Instruction format – Types of instruction – Programming for 8-bit addition, 8-bit subtraction, Largest number in an array of 8bit unsigned numbers and Smallest number in an array of 8-bit unsigned numbers

BOOKS FOR STUDY:

1. Digital principles and applications Malvino& Leach
2. Modern digital electronics R.P.Jain
3. Integrated electronics Milmann&Hakias
4. Introduction to integrated electronics
5. **Digital & Analog** V. vijayendran
6. Microprocessor architecture programming And application with 8085/8080A Gaonkar.

BOOK FOR REFERENCE:

1. Digital electronics Gotham
2. Digital Principles Schaum's series
3. Digital Electronics and microcomputers R.K.Gaur
4. Digital logic and computer design Morris and Mano

MAJOR BASED ELECTIVE III

COMPUTER PROGRAMMING – ‘C’ LANGUAGE

CODE :

UNIT 1 : DATA TYPES ,OPERATORS AND EXPRESSIONS

History of C – Importance of C – Basic structure of C Programs – Programming style –

Executing a ‘C; program – Character set – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables.

Operators – Classification – Arithmetic expression and its evaluation – Precedence and Associativity of operators.

UNIT II : I/O , CONTROL STATEMENTS AND ARRAYS

Library functions- gets,puts,getchar,putchar functions – Formatted input (scanf) and Formatted output(printf)- Decision making with if-simple if-if ...else-nested if ...else .The Else if ladder-switch-goto-break-continue-while-dowhile-for statements.

Arrays-One dimensional arrays – Declaration of one dimensional arrays- Initialization of one dimensional arrays – Two dimensional arrays – Declaration of two dimensional arrays- Initialization of Two dimensional arrays- Multidimensional arrays – Character strings – Initialization-String handling function.

UNIT III: FUNCTION AND STRUCTURE

Function-Function definition-Return statement-Function call-Function declaration-Types of functions-Local and Global variables-Recursion-Storage class- CharacterStrings-Initialization-String Handling function.Structures- Declaring structure variables-Accessing structure member – structure initialization-String Handling function.

UNIT IV : POINTERS , FILES AND PREPROCESSORS

Pointers- The address operator(&)- The indirection operator(*)-Initialization of pointer variables- Pointer arithmetic- Pointers and functions-Pointers as function arguments-Pointers and arrays – Pointer to pointers.

Files in C-File declaration – Opening and closing a file- Accessing a file – Character,Integer and String oriented I/O functions- Formatted and Unformatted I/O functions-Error handling during I/O operations- Random access files – Functions used with Random Files.

UNIT V : PROGRAMS

Development of algorithm ,flowchart and program for the following problems:

1. Solving quadratic equations
2. Roots of algebraic equations –Newton Raphson method.
3. Finding the smallest/largest element in an array
4. Sorting a set of numbers in ascending/descending order.
5. Addition/Subtraction/Multiplication of two matrices

BOOKS FOR STUDY:

1. Programming in ANSI C.E. Balagurusamy.
2. Pointers in C Yashwant Kanitkar
3. Programming in C Shymala Krishnan
4. Schaum’s outline series theory and problems of programming with C Byron S.Gottrified
5. Programming with C Venugopal K.P.& sudep R.P

EC- BIO- MEDICAL INSTRUMENTATION

Unit I TRANSDUCERS

Transducers & Transduction principles – Active principles – Piezoelectric effect – thermoelectric effect – Photoelectric effect – Passive transducers – Passive transducers using inductive, Capacitive, circuits elements – Transducers for biomedical applications.

Unit II BIOELECTRIC POTENTIALS AND ELECTRODES

Sources of bioelectric potentials – Resting and acting potentials – Propagation of action potentials – Bioelectric potentials – The Electrocardiogram (ECG) – Electrode theory – Bio potential electrodes – Biochemical transducers.

Unit III CARDIOVASCULAR MEASUREMENTS

Blood Pressure – Characteristics of blood flow – heart sounds – Electrocardiography – ECG amplifiers – Electrodes & leads – ECG recorder Principles – Measurement of blood

Flow and cardiac output – Measurement of heart sound – Pacemakers – Pacemaker systems – Pacing modes and pulse generators – Power sources of electromagnetic interference.

UNIT IV RESPIRATORY SYSTEM

Tests & Instrumentation for the mechanics of breathing – Lung volumes & capacities – Measurement of gaseous exchanges & diffusion – Ventilator& respirator- Measurement of Systemic body temperature – Thermography – Skin Temperature measurements.

UNIT V ULTRASONIC IMAGING

Ultrasonic imaging – Ultrasonic diagnosis – Ultrasonic transducers _ Echoencephalography – Ophthalmic scans – Ultrasonic imaging –Neuronal firing measurements – electromyographic measurements –Biomedical application – Computer analysis – of the Electrocardiogram – Computerized axial tomography(CAT) scanners.

BOOKS FOR STUDY

1.Leslie Cromwell, Fred J.Weibell, erich A. Pfeiffer- Biomedical

Instrumentation&Measurements- Second Edition (Pearson Education)

SOFT SKILL I : ELECTRICAL APPLIANCES

UNIT I : AUTOMATIC ELECTRIC IRON, MIXER AND GRINDER

Parts of an automatic electric iron box - Heating arrangement – Thermostat – wiring requirements

Parts of a mixer – motor – RPM control – over load indicator

Parts of a grinder – motor – grinding arrangement – trouble shooting

UNIT – II : ELECTRIC FAN AND FLUORESCENT LAMP

Parts of a fan – motor – winding – rotor and stator – swing arrangement of a table fan – use of condenser and regulators

Parts – Choke – Starter – Bulb – compact fluorescent lamps

UNIT – III : AIR CONDITIONERS AND REFRIGERATORS

Parts of an A/C and refrigerator – Power supply – compressor loads – tonnage calculation – location selection for installation

UNIT – IV : WASHING MACHINES

Parts of a washing machine – supply load – water supply – earthing – automatic and semiautomatic type machines – motor speed control – over load indication

UNIT – V: HOUSE WIRING

Single phase, two phase and three phase electrical supply – neutral and line – fuse wire and working of a fuse – tripper- Switches – one way and two way switches – plugs – wiring for lamps and motors

Books for study and reference :

L. R. Hans, and M. L. Anwani, Basic shop practicals in Electrical Engineering, Dhanpat Rai, Delhi

Xavier and Radhakrishnan (Tamil Version)

