DUVVURU RAMANAMMA WOMEN'S COLLEGE, GUDUR

Modified First Year Degree Physics Syllabus for Maths Combination

Theory Paper – I Mechanics
(2010-2011)

Unit – I

1,Fluid Flow(10)

The flow of ideal fluids-equation of continuity- Bernoulli's Equation-Torricelli's theorem-the venture effect and its medical importance's - picot's tube and its use in physiology-viscosity and the flow of real fluids.

2. Mechanics of Particles (10)

Laws of motion, motion of variable mass system, motion of a rocket, multi – stage rocket, conservation of energy and momentum. Collisions in two and three dimensions, concept of impact parameter, scattering cross – section, Rutherford scattering.

3. Mechanics of rigid bodies (10):

Definition of Rigid body, rotational kinematics relations, equation of motion for a rotating body, angular momentum and inertial tensor. Euler's equation, precession of a top, Gyroscope precession of the equinoxes.

Unit – II

4. Mechanics of continuous media(8)

Elastic constants of isotropic solids and their relation, Poisson's ration and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions, simple supported beam carrying a concentrated load at mid span, cantilever with an end load.

5. Central forces(12)

Central forces – definition and examples, conservative nature of central forces, conservative force as a negative gradient of potential energy, equation of motion under a central force, gravitational potential and gravitational field, motion under inverse square law, derivation of Kepler's laws, Coriolis force and its expressions.

6. Special theory of relativity(10)

Galilean relativity, absolute frames, Michelson – Morley experiment, Postulates of special theory of relativity. Lorentz transformation, time dilation, length contraction, addition of velocities, mass – energy relation. Concept of four vector.

Reference Books

1. Fundamental of physics by Alan Giambattista et al Tata-McGraw Hill Company Edition, 2008.
2. University Physics by Young and freeman, Pearson Education, Edition 2005
3. Sears and Zemansky's University Physics by Hugh D.Young, Roger A. Freedman Pearson Education Eleventh Edition.
4. An introduction to Mechanics by Daniel Kleppner & Robert Kolenkow. The McGrow Hill Companies.
5. Mechanics. Hans & Puri. TMH Publications.
6. Engineering Physics R.K. Gaur & S.L. Gupta. Dhanpat Rai Publications.

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DUVVURU RAMANAMMA WOMEN'S COLLEGE, GUDUR

B.Sc PHYSICS PAPER-I

FIRST SEMISTER

Mechanics

(Non-Maths Combination Physics)

(W.e.f. 2013-14)

UNIT-I:

1. MATHEMATICAL BACKGROUND:

Elements of calculus-Differentiation-Geometrical meaning of the derivative-Partial Differentiation-Integration-Definite integral and its geometrical interpretation- general ideas about differential equations and their solutions Scalars and Vectors-Vector addition-scalar and vector products of vectors and their physical significance-Scalar and Vector calculus-Gradient of a scalar point function-Divergence an curl of vectors-statements of stokes and gauss theorems.

2. MOTION OF A SYSTEM:

Elastic and inelastic collisions-Collisions in one and two dimensions-Rocket propulsion-Centre of mass-motion of the centre of mass-Impact parameter-Scattering cross section.

3 .ROTATION OF RIGID BODY:

The vector nature of rotation-Rotational Kinetic energy and Moment of inertia-Calculating the moments of inertia in simple cases-Parallel perpendicular axes theorems-Torque-Relation between torque and angular momentum.

Angular momentum of a particle-Torque and angular momentum for a system of particles- Conservation of angular momentum-Translation and rotation-Elementary ideas about gyroscopic motion (No derivation-discussion of results).

UNIT -II:

1 .CENTRAL FORCE OF MOTION:

Central forces-General properties of central force motion-Motion under inverse square law-planetary motion-Kepler's laws-Satellite motion

2. RELATIVISTIC EFFECTS:

(Elementary treatment only; applications to be covered) Moving reference frames-Inertial reference frames-Galilean relativity-Special theory of relativity-Statements of the two basic postulates. The following without derivations but with important applications: Lorentz transformations equations-Lorentz length contractions-Time dilation-Velocity addition-Momentum and relativistic mass-Mass-Energy Equivalence-Equation relating energy, rest mass & momentum of a particle.

(G. UDAYA BHASKARA REDDY)

Text books and References

1. Physics-Paul A.Tipler(C B S Publishers and distributors)
2. Physics for biology and free medical students-DM.Burns and S.G.G.Macdonald (addition-Wesley)
3. B.Sc physics volume-I-mechanics,waves and oscillations C.M.M.Sastry and others (S.Chand and co)
4. An introduction to mechanics-klippner and kolekow (McgrawHill Kogakersha)
5. Introduction to physics for scientists and engineers-F.J.Bueche (McgrawHill international)

(G. UDAYA BHASKARA REDDY)

DUVVURU RAMANAMMA WOMEN'S COLLEGE, GUDUR

Modified First Year Degree Physics Syllabus for Maths Combination

Theory Paper – II Waves and Oscillations
(2010-2011)

Unit – I:

1. Fundamentals of vibrations(12):

Simple harmonic oscillator, and solution of the differential equation – Physical characteristics of SHM, torsion pendulum, - measurements of rigidity modulus, compound pendulum, measurement of 'g', combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies, Lissajou's figures.

2. Damped and forced oscillation(12)

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparision with undamped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance, velocity resonance.

3. Complex vibrations(6)

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions – square wave, triangular wave, saw – tooth wave.

Unit – II

4. Vibrations of bars(12)

Longitudinal vibrations in bars – wave equation and its general solution. Special cases (i) bar fixed at both ends ii) bar fixed at the mid point iii)bar free at both ends iv) bar fixed at one end. Transverse vibrations in a bar – wave equation and its general solution. Boundary conditions, clamped free bar free-free bar, bar supported at both ends, Tuning fork.

5. Vibrating strings(12)

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at both the ends, overtones,energy transport, transverse impedance.

6. Ultrasonics (6)

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves. Velocity of ultrasonics in liquids by Sear's method. Applictions of ultrasonic waves.

Reference Books

6. Fundamental of physics by Alan Giambattista et al Tata-McGraw Hill Company Edition, 2008.
7. University Physics by Young and freeman, Pearson Education, Edition 2005
8. Sears and Zemansky's University Physics by Hugh D.Young,'Roger A. Freedman Pearson Education Eleventh Edition.
9. An introduction to Mechanics by Daniel Kleppner &Robert Kolenkow. The McGrow Hill Companies.
10. Mechanics. Hans & Puri. TMH Publications.
11. Engineering Physics R.K. Gaur & S.L. Gupta. Dhanpat Rai Publications.

DUVVURU RAMANAMMA WOMEN'S COLLEGE, GUDUR

Modified First Year Degree Physics Syllabus for Non- Maths Combination

Theory Paper – II Waves and Oscillations
(2010-2011)

1. CENTRAL FORCE MOTION;

Central forces – General properties of central force motion – Motion under inverse square law – Planetary motion – Kepler's laws – Satellite motion.

2. OSCILLATORY MOTION:

Simple harmonic motion – Equation of motion and solution – Simple harmonic motion from the standpoint of energy – The rotor diagram representation of simple harmonic motion – Combinations of simple harmonic motions along a line and perpendicular to each other – Lissajous figures – The damped harmonic oscillator Equation of motion – Assumption of solution for various boundary conditions – The driven harmonic oscillator - Equation of motion. Assumptions of solution – Resonance – Sharpness of resonance – Q factor.

3. FLUID FLOW:

The flow of ideal fluids – Equation of continuity – Bernoulli's equation – Torricelli's theorem – The venture effect and its medical importance – Pitot's tube and its use in physiology – Viscosity and the flow of real fluids.

4. WAVE MOTION:

Progressive waves – Equation of a progressive wave – Sinusoidal waves – Velocities of waves in elastic media (Sound waves in material media and transverse waves on strings – no derivations) – Standing waves – Transverse vibrations of stretched strings clamped at both ends – Overtones and Harmonics – Chladni figures – Beats – Intensity and Intensity level – Noise and its effects.

5. ULTRASONICS:

Generators of Ultrasonics – Piezoelectricity ,Magnetostrction – Detection of Ultrasonic waves – Applications of Ultrasonics.

Text books and References

1.physics- Paul A.Tipler (C B S Publishers and distributors)
2.physics for biology and free medical students-DM.Burns and S.G.G Macdonald(addition-Wesley)
3.B.Sc physics volume-I- mechanics, waves and oscillations C.M.M.Sastry and others (S.Chand and co)
4.An introduction to mechanics- klippner and kolekow (McgrawHill Kogakersha)
5.Introduction to physics for scientists and engineers -F.J.Bueche (McgrawHill international)

B.Sc PHYSICS PAPER-III
THIRD SEMISTER
Thermodynamics
(Maths Combination Physics)
(w.e.f. 2013-14)

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UNIT-I

1. Kinetic theory of gases (08)

Introduction-Deduction of Maxwell's law of distribution of molecular speeds-Transport Phenomena-Viscosity of gases-thermal conductivity-diffusion of gases.

2. Thermodynamics (12)

Introduction-Reversible and irreversible processes- carnot's engine and its efficiency-carnot's theorem-second law of thermodynamics, kelvin's and claussius statements-Thermodynamics scale of temperature- Entropy, physical significance-change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of universe-Temperature-Entropy (T-S)diagram-change of entropy of a perfect gas-change of entropy when ice changes into steam.

3. Thermodynamic potentials and Maxwell's equations (10)

Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius-Claperon's equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and Vanderwaal's gas.

UNIT-II

4. Low temperature physics (10)

Introduction-Joule Kelvin effect-liquefaction of gas using porous plug experiment. Joule expansion-Distinction between adiabatic and Joule Thomoson expansion-Expression for Joule Thomson cooling-Liquefaction of helium, Kapitza's method- Adiabatic demagnetization-Applications of substances at low-temperature

5. Quantum theory of radiation (10)

Black body-Ferry's black body-distribution of energy in the spectrum of Black body-Wein's displacement law, Wein's law, Rayleigh-Jean's law-Quantum theory of radiation-Planck's law-deduction of Wein's law, Rayleigh-Jeans law from Plank's law-Measurement of radiation-Types of Pyrometers-Disappearing filament optical pyrometer-exparimental determination-Angstrom pyroheliometer- determination of solar constant,effective tempature of sun.

6. **Statistical Mechanics: (10)**

Introduction to statistical mechanics, concept of ensembles, Phase space, Maxwell-Boltzmann's distribution law, Molecular energies in an ideal gas, Bose-Einstein Distribution law, Fermi-Dirac Distribution law.

Reference Books

1. Modern Physics by G. Aruldhas and P. Rajagopal, *Eastern Economy Education.*
2. Berkeley Physics Course. Volume-5. Statistical Physics by F. Reif. *The McGraw-Hill Companies.*
3. An Introduction to Thermal Physics by Daniel V. Schroeder.*Pearson Education Low Price Edition.*
4. Thermodynamics by R.C. Srivastava, Subit K. Saha & Abhay K. *Jain Eastern Economy Edition.*

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (AUTONOMOUS) GUDUR

B.Sc., PHYSICS, THIRD SEMISTER

Paper-III Optics (Non-Maths Combination Physics)

w.e.f. 2014-15

UNIT I:

1. Eye-Vision

Introduction-Structure of Eye, Defects of Vision and Correction-Short sight(Myopia), Long sight (Hyperopia), Presbyapia, Astigmatism- Quatum Response of the eye-Visual acuity-Photo Sensitive Pigment in the eye-Colour Vision-Insect Eye.

2. Interference

The superposition principle-Conditions for interference-Classification of interference methods-Young's double slit experiment-Theory-Interference with white light and appearance of Young's interference fringes-Intensity in interference pattern-optical path length-Lloyd's single mirror-phase change on reflection-Interference due to plane-parallel and Wedge-Shaped films- Colours in thin films- Newton's rings-Michelson's interferometer.

UNIT II:

3. Diffraction

The Fresnel and Fraunhofer diffraction phenomena-Fraunhofer diffraction from a single slit(Normal incidence and oblique incidence)-Resolving power- limits of resolution for Telescope and Microscope-Numerical aperture- objective-Fraunhofer Diffraction by a double slit-Intensity pattern-Missing orders- -The diffraction grating-Dispersion-Absent spectra- Resolvance-wavelength determination(Normal incidence and minimum deviation mcthods

4. Polarization

Types of polarized light-Polarization by reflection-Brewster's law- Dichroism-The Polaroid film-Double refraction-The calcite crystal-The principal plane-O and E rays-The Nicol prism-Law of Malus-The quarter wave plate- plane, circularly and Elliptically polarized light: production and Analysis-Optical activity-specific rotatary power-The Fresnel theory-s Polarimeter .Holography principles and Applications.

Reference Books

1. Physics for Biology and pre-medical student D.M.Burns& S.G.G.Macdonald, Addison- Wesley.
2. Optics-D.P. Khandelwal (Himalayan Publishing House)
3. Introduction to modern Optics-G.R.Fowles-Holt Binehard
4. Optics- Satya Prakash-Ratan Prakash.
5. Fundamentals of Optics- Jenskins & White (McGraw Hill Kogakusha)
6. Wave Optics and its Applications- Rajpal S.Sirohi- Orient LongmanS
7. Common core Physics Paper II Telugu academy
8 Physics First part(for non maths students) Telugu Acedamy.

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DUVVURURAMANAMMAWOMEN'S(AUTONOMOUS)COLLEGE,GUDUR

B.SC Physics Maths Combination

Theory Paper – IV Thermodynamics

Semester-IV

W.e.f. 2014-15

Unit – I

1. **Kinetic theory of gases:**

Introduction – Deduction of Maxwell's law of distribution of molecular speeds, Experimental verification Toothed Wheel Experiment, Transport Phenomena – Viscosity of gases – thermal conductivity – diffusion of gases.

2. **Thermodynamics:**

Introduction – Reversible and irreversible processes – Carnot's engine and its efficiency – Carnot's theorem – Second law of thermodynamics, Kelvin's and Claussius' statements – Thermodynamic scale of temperature – Entropy, physical significance – Change in entropy in reversible and irreversible processes – Entropy and disorder – Entropy of universe – Temperature-Entropy (T-S) diagram – Change of entropy of a perfect gas-change of entropy when ice changes into steam.

3. **Thermodynamic potentials and Maxwell's equations:**

Thermodynamic potentials – Derivation of Maxwell's thermodynamic relations – Clausius-Clayperon's equation – Derivation for ratio of specific heats – Derivation for difference of two specific heats for perfect gas. Joule Kelvin effect – expression for Joule-Kelvin coefficient for perfect and Vanderwaal's gas.

Unit – II

4. **Low temperature Physics:**
Introduction – Joule-Kelvin effect – liquefaction of gas using porous plug experiment. Joule expansion – Distinction between Joule-adiabatic and Joule- Thomson expansions – Expression for Joule-Thomson cooling – Liquefaction of helium, Kapitza's method – Adiabatic demagnetization – Production of low temperatures – Principle of refrigeration, vapour compression type. Working of refrigerator. Effects of Chloro and Fluro Carbons on Ozone layer; applications of substances at low- temperature.

5. **Quantum theory of radiation:**
Black body-Fery's black body – distribution of energy in the spectrum of Black body – Wein's displacement law, Wein's law, Rayleigh-Jean's law – Quantum theory of radiation - Planck's law – deduction of Wein's law, Rayleigh-Jeans law, from Planck's law - Measurement of radiation –Types of pyrometers – Disappearing filament optical pyrometer – experimental determination – Angstrom pyroheliometer - determination of solar constant, effective temperature of sun.

6. **Statistical Mechanics:**

Introduction to statistical mechanics, concept of ensembles, Phase space, Maxwell-Boltzmann's distribution law, Molecular energies in an ideal gas, Bose-Einstein Distribution law, Fermi-Dirac Distribution law

Reference Books

1. Second Year Physics – *Telugu Academy*
2 .Fundamentals of Physics. Halliday/Resnick/Walker.*C. Wiley India*
3. An Introduction to Thermal Physics by Daniel V. Schroeder.*Pearson Education Low Price Edition.*
4.Thermodynamics by R.C. Srivastava, Subit K. Saha & Abhay K. *Jain Eastern Economy Edition.*
5.Unified Physics Vol.2 – S.L. Gupta and Sanjeev Gupta – Jai Prakasah Nath & Co-Meerut

DUVVURU RAMANAMMA WOMEN'S COLLEGE,GUDUR.
B.Sc PHYSICS PAPER-II
FOURTH SEMISTER

Optics

(Non-Maths Combination Physics)

UNIT I

1. Eye-Vision

Eye and vision.

Introduction-Structure of Eye, Defects of Vision and Correction-Short sight(Myopia), Long sight (Hyperopia), Presbyapia, Astigmatism- Quatum Response of the eye-Visual acuity-Photo Sensitive Pigment in the eye-Colour Vision-Insect Eye.

2. Interference

The superposition principle-Conditions for interference-Classification of interference methods-Young's double slit experiment-Theory-Interference with white light and appearance of Young's interference fringes-Intensity in interference pattern-optical path length-Lloyd's single mirror-phase change on reflection-Interference due to plane-parallel and Wedge-Shaped films- Colours in thin films- Newton's rings-Michelson's interferometer.

UNIT II

3. Diffraction

The Fresnel and Fraunhofer diffraction phenomena-Fraunhofer diffraction from a single slit(Normal incidence and oblique incidence)-Resolving power- limits of resolution for Telescope and Microscope-Numerical aperture- objective-Fraunhofer Diffraction by a double slit-Intensity pattern-Missing orders- -The diffraction grating-Dispersion-Absent spectra- Resolvance-wavelength determination(Normal incidence and minimum deviation methods

4. Polarization

Types of polarized light-Polarization by reflection-Brewster's law- Dichroism-The Polaroid film-Double refraction-The calcite crystal-The principal plane-O and E rays-The Nicol prism-Law of Malus-The quarter wave plate- plane, circularly and Elliptically polarized light: production and Analysis-Optical activity-specific rotatary power-The Fresnel theory- Polarimeter .Holography principles and Applications.

Code No : 5111

B.Sc (Physics) - V Semester
Paper – V: Electrostatics & Electricity
(For Mathematical Combination)

Unit – I

1. Electrostatics

Gauss law proof and its applications- (1) Uniformly charged sphere, (2) an infinite conducting sheet of charge. Electric potential – Potential due to a charged spherical conductor, , electric field strength from the electric dipole.

2. Capacitance

Capacitance of concentric spheres and cylindrical condenser, capacitance of parallel plate condenser with and without dielectric. Electric energy stored in a charged condenser – force between plates of condenser, construction and working of attracted disc electrometer, measurement of dielectric constant and potential difference.

Unit – II

1. Varying and alternating currents Growth and decay of currents in LR, CR and LCR circuits – Critical damping. Alternating current relation between current and voltage in pure R,C and L-vector diagrams – Power in ac circuits. LCR series and parallel resonant circuit – Q-factor.

2. Maxwell's equations and electromagnetic waves

A review of basic laws of electricity and magnetism – displacement current – Maxwell's equations in differential form – Maxwell's wave equation, plane electromagnetic waves – Transverse nature of electromagnetic waves, Poynting theorem, production of electromagnetic waves (Hertz experiment)

Textbooks

1. Berkeley Physics Course – Vol. II - Electricity and Magnetism – Edward M Purcell –*The McGraw-Hill Companies.*
2. Electricity and Magnetism – D.N. Vasudeva. *S. Chand & Co.*
3. Electricity and Magnetism Brijlal and Subramanyam. *Ratan Prakashan Mandir.*
4. Third year Physics – *Telugu Akademy*

Reference Books

1. Electricity and Electronics – D.C. Tayal. *Himalaya Publishing House.*
2. Electricity and Magnetism – C.J.Smith. *Edward Arnold Ltd.*
3. Electricity, Magnetism with Electronics – K K Tewari. *R.Chand & Co.*

Code NO : 5112

DUVVURU RAGHUNADHAM WOMEN'S COLLEGE (AUTONOMOUS), DUVVURU

B.Sc. (Physics) - V Semester
Paper -VI: Atomic & Nuclear Physics
(For Mathematical Combination)

Unit – I

Atomic Physics

Introduction – Drawbacks of Bohr's atomic model - Sommerfeld's elliptical orbits – relativistic correction (no derivation). Stern & Gerlach experiment Vector atom model and quantum numbers associated with it. L-S and j-j coupling schemes. Zeeman Effect.

Molecular Spectroscopy:

Raman effect, Classical theory of Raman effect. Experimental arrangement for Raman effect and its applications

Unit – II

Nuclear Structure:

Basic properties of nucleus – size, charge, mass, spin, magnetic dipole moment and electric quadrupole moment. Binding energy of nucleus, deuteron binding energy,. Nuclear models – liquid drop model, shell model.

Alpha and Beta Decays: Range of alpha particles, Geiger – Nuttal law. Gammow's theory of alpha decay. Geiger – Nuttal law from Gammow's theory. Beta spectrum – neutrino hypothesis, Fermi's theory of β-decay (qualitative). Nuclear Detectors – GM counter, Wilson cloud chamber and Bubble chamber.

Textbooks

1. Nuclear Physics by D.C. Tayal, *Himalaya Publishing House.*
2. Molecular Structure and Spectroscopy by G. Aruldhas. *Prentice Hall of India, New Delhi.*
3. Spectroscopy –Atomic and Molecular by Gurdeep R Chatwal and Shyam Anand –*Himalaya Publishing House.*
4. Third Year Physics - *Telugu Academy.*

Reference Books

1. University Physics with Modern Physics by Young & Freedman, A. Lewis *Ford. Low Price Edition (Eleventh Edition).*
2. Quantum Physics by Eyvind H. Wichman, Volume.4. *The McGraw-Hill Companies.*
3. Quantum Mechanics by Mahesh C. Jani. *Eastern Economy Edition.*
4. Nuclear Physics Irving Kaplan – *Narosa Publishing House.*

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (AUTONOMOUS), GUDUR

B. Sc Physics - V Semester

PAPER –V: Electrostatics & Electricity

(For Non-Mathematical Combination)

UNIT-I:

1. Electrostatics:

1 (A) Electric Field & Potential:

Coulomb's Laws its verification (by Cavendish method) – Electric field & Intensity of Electric Field – Intensity of Electric field due to (i) a point charge, (ii) infinitely long charged wire, (iii) finite line of charge – Electric dipole in an Electric field – Torque on an electric dipole – Gauss's Law its application to (i) Uniformly charged sphere (ii) charged cylinder (iii) Infinite sheet of charge – Force on the surface of a charged conductor – Deduction of coulomb's Law from Gauss's Law. Electric Potential: Equipotential surfaces – Potential due to (i) a point charge (ii) charged spherical shell and (iii) uniformly charged circular disc. Electrostatic imaging – Xerography (description); van de Graff Generator.

2. (B) Capacitance & Dielectrics:

Derivation of expression for (i) parallel plate capacitor and (ii) spherical capacitor Dielectrics. Energy stored in capacitor – Electric dipole and molecular polarizability – Electric displacement D and electric polarization P Relation between D, E, and P.

UNIT-II:

1. Current Electricity:

Current & Current Density – drift velocity – Derivation of expression – Resistivity and conductivity (definitions) – Kirchiaf Laws - Statement, explanation and application to Wheatstone Bridge Sensitivity of Wheatstone Bridge ; Carey – Foster's Bridge Experiment to measure temperature coefficient of Resistances - Strain Guage – Piezo electric transducers (application only)

2. A.C. circuits:

Peak, Average and RMS values of alternating currents and voltages – derivation and their interrelationships – Form Factor – power in a.c. circuits – Power Factor Alternating currents in resistances – L-R, C-R and L-C-R- series circuits – Inductance and capacitance – Inductive and capacitive resistances – Resonance –Q factor: Parallel L-C-R-circuit – Skin Effect – Generators, Motors and Transformers (Explanation of principles only)

References:

1. Electrostatics & Magnetic Properties of Matter – Telugu Academy.

2. Electricity – Telugu Academy.

3. Physics – Part – II – resnic & Holliday.

4. Electricity and Magnetism with Electronics – K.K.Tewari (Chand & Co)

5. Medical Instrumentation – S.P. Guha.

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (AUTONOMOUS), GUDUR

B. Sc Physics - V Semester

Paper –VI: MODERN PHYSICS

(For Non-Mathematical Combination)

UNIT-I:

1. Fundamentals of Quantum Optics:

Photoelectric Effect – Explanation through demonstration Einstein's Photoelectric Equation – its verification by Millikan's experiment – Theory of Compton Effect and its experimental verification - Bohr's theory of Hydrogen atom – Derivation of expression for Energy levels and spectral Series of Hydrogen atom – Bohr's correspondence Principle –Explanation of different types of quantum numbers.

2. X-Rays :

X –Ray Spectra: Continuous & characteristic X –Ray Spectra – Mosley's Law & its importance – X – Ray diffraction – Bragg's Law – Its experimental verification

3. Effects of Radiation:

Medical & Biological Effects of Radiation – Radiation Hazards and Protection

UNIT-II:

1. Wave Nature of Matter:

Dual natures of Radiation – de Broglie's theory of matter waves – Davisson & Germer experiment on electron diffraction – Heisenberg's Uncertainty principle- (a) determination of position of a particle by microscope (b) diffraction by a single Slit – Meaning of the Wave Function – Schrodinger wave equation (no derivation) -Explanation .

2. Cosmic Rays:

Discovery – Altitude & Latitude effects – Directional effects – Van Allen Belts – Primary and Secondary cosmic rays – pair production and annihilation – Cosmic rays showers – Discovery and types of mesons – Elementary particles: Classification and their nature.

3. Lasers:

Lasers – Spontaneous & Stimulated emission – Population inversion – Ruby, Helium Neon Lasers –Description and working only- Uses of lasers.

Reference :

1. Physics for Biology & Premedical Students by D.M.Burns and S.G.G. Mac . Donald (Addissan Wisley).

2. Concepts of Modern Physics by A. Beiser (Mc Graw Hill)

3. Perspsctives of Modern Physics By A. Beiser (Mc Graw Hill)

6111

B.Sc (Physics) - VI Semester
Paper – VII: Magnetism and Electronics
(For Mathematical Combination)

Unit – I

1. Moving charge in electric and magnetic field

Hall effect, cyclotron, synchrocyclotron and synchrotron – force on a current carrying conductor placed in a magnetic field, force and torque on a current loop, Biot –Savart's law and calculation of B due to long straight wire, a circular current loop and solenoid.

2. Electromagnetic induction

Faraday's law –Lenz's law – expression for induced emf – time varying magnetic fields – Betatron –Ballistic galvanometer – theory – damping correction – self and mutual inductance, coefficient of coupling, calculation of self inductance of a long solenoid – toroid – energy stored in magnetic field – transformer – Construction, working, energy losses and efficiency.

Unit – II

1. Basic Electronics

Formation of electron energy bands in solids, classification of solids in terms of forbidden energy gap. Intrinsic and extrinsic semiconductors, Fermi level, continuity equation – p-n junction diode, Zener diode characteristics and its application as voltage regulator. Half wave and full wave rectifiers and filters, ripple factor (quantitative) – p n p and n p n transistors, current components in transistors, CB,CE and CC configurations – transistor hybrid parameters – determination of hybrid parameters from transistor (CE) characteristics

2. Digital Principles

Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods).
Logic gates: OR,AND,NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate, De Morgan's Laws – statement and proof, Half and Full adders. Parallel adder circuits.

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (ATONOMOUS): GUDUR

B.Sc. (Physics) - VI Semester

Paper - VIII: Modern Physics

(For Mathematical Combination)

Unit – I

Matter Waves:

de Broglie's hypothesis – wavelength of matter waves, properties of matter waves. Phase and group velocities. Davisson and Germer experiment. Double slit experiment. Standing de Brogile waves of electron in Bohr orbits.

Uncertainty Principle:

Heisenberg's uncertainty principle for position and momentum (x and p_x), Energy and time (E and t). Gamma ray microscope. Diffraction by a single slit. Position of electron in a Bohr orbit. Particle in a box. Complementary principle of Bohr.

Schrodinger Wave Equation:

Schrodinger time independent and time dependent wave equations. derivates Wave function properties – Significance. . Application of Schrodinger wave equation to particle in one dimensional infinite box,

Unit – II

X-ray Diffraction: Diffraction of X –rays by crystals, Bragg's law, Experimental techniques - Laue's method and powder method.

Nanomaterials: Introduction, nanoparticles, metal nanoclusters, semiconductor nanoparticles, carbon clusters, carbon nanotubes, quantum nanostructures – nanodot, nanowire and quantum well.

Magnetism: Magnetic properties of dia, para and ferromagnetic materials. Langevin's theory of paramagnetism. Weiss' theory of ferromagnetism –

Superconductivity:

Basic experimental facts – zero resistance, effect of magnetic field, Meissner effect, persistent current, Isotope effect Thermodynamic properties, specific heat, entropy. Type I and Type II superconductors.

NOTE: Problems should be solved from every chapter of all units

Textbooks

1. **Modern Physics** by G. Aruldhas & P. Rajagopal. *Eastern Economy Edition.*
2. **Concepts of Modern Physics** by Arthur Beiser. *Tata McGraw-Hill Edition.*
3. **Modern Physics** by R. Murugeshan and Kiruthiga Siva Prasath. *S. Chand & Co.*
4. **Third Year Physics** - *Telugu Academy.*

Reference Books

1. **University Physics with Modern Physics** by Young & Freedman. *A. Lewis Ford. Low Price Edition (Eleventh Edition).*
2. **Quantum Physics** by Eyvind H. Wichman. Volume.4. *The McGraw-Hill Companies.*
3. **Quantum Mechanics** by Mahes C. Jani. *Eastern Economy Edition.*

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (AUTONOMOUS), GUDUR

B. Sc Physics - VI Semester

Paper - VII: Electromagnetism & Ionic conduction

(For non –mathematical combination)

Chapter – I: Ionic Conduction

Faraday's Laws of Electrolysis – Ionic conductivity – Derivation of expression – Measurement by Kohlrausoh method –Primary and Secondary Cells :Voltaic cell & Lead Acid coil ; Resistance in the human body, Electrical transmission in neutral conduction across a synapse ; conduction in muscles – Electric activity in the heart – Electrocardiography – Auditory hear Warning systems – Electromyography- Artificial pacemakers – Direct stimulation of nerves.

Chapter II: Electromagnetism:

Magnetic Induction B Magnetic Flux - Biot – Savart's Law –Magnetic Induction due to (i) a long straight conductor carrying current (ii) on the axis of a circular coil and (iii) solenoid ; Ampère's Law – Derivation of expression for a force on (I) charged particles and (ii) current carrying conductor in magnetic field – Hall Effect and its importance – Electromagnetic pumping.

Chapter III: Electromagnetic Induction:

Faraday's Law of Electromagnetic induction, Lenz's Law – Demonstration of electromagnetic induction – Application to generator – back emf Eddy currents – Construction, theory and uses of Ballistic galvanometer damping correction – Self Induction & Mutual Induction Units – Measurement of L & M by Raleigh Method and direct method respectively measure and decay of currents in L R, C-R and L-C-R Circuits (d.c).

Chapter IV: Magnetism:

Types of magnetic materials – diamagnetic, paramagnetic and ferromagnetic materials and their properties – Magnetic Intensity Magnetic susceptibility X – Derivation for expression relating I,H and X – Curie Temperature – Explanation of Remnance, Coercive force and Hysteresis curve – Loss of energy _ Weiss theory of Ferromagnetism.

References:

1. Physics for Biology and Premedical students – D.M.Burns and S.G.G.Mac.Donald
2. Electrostatics & Magnetic Properties of Matter – Telugu Academy.
3. Physics – Part – II – resnic & Holliday.
4. Medical Instrumentation – S.P. Guha.

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DUVVURU RAMANAMMA WOMEN'S COLLEGE (AUTONOMOUS), GUDUR

B. Sc Physics - VISemester

Paper –VIII: Nuclear physics & Electronics

(For Non-Mathematical Combination)

1. Radio-Activity:

The nature of radio- active emissions – the Law of Radioactive Decay, derivation – Decay constant – Half Life & Mean Life Periods, derivations – Units of Radio -activity – Carbon and Uranium Dating (Explanation only) – Radioactive Isotopes as Tracers – Studies of Metabolic uptake – Isotopic dilution – Location of hemorrhage - Radiocardiography - Radiotherapy – radiation detectors : (i) Scintillation counter (ii) GM counter (iii)Cloud chamber and (iv) Bubble chamber.

2. Nucleus :

Artificial Transmutation – Discovery of Neutron – Description of the experiment – Binding energy & Stability of Nucleus – Particle Accelerators : (i) Cyclotron (ii) Synchro cyclotron and (iii) Betatron - Description working and theory – Nuclear reactions involving neutrons – Nuclear Fission: energy per fission, nuclear reactor – Nuclear fusion: Energy released in Fusion – Carbon – Nitrogen cycle – Mass spectroscopy : Dempster Bainbridge Mass spectrographs – Description and working.

3. Electronics :

Energy Band theory of Solids – The Junction Diode – V -I Characteristics – Zener Diode - Half wave & Full wave Rectifiers (Semiconductor type) – action of filters π and L – type – PNP & NPN Transistors – Configurations - C E Characteristics – CE, R-C Amplifier – Hartley oscillator – C.R.O circuit and working

Block diagram and sketch – Principle, Description – Time base circuits – Measurement of d.c voltage, a.c voltage, phase and frequency.

4. Digital Principles:

Binary number system, converting Binary to Decimal and vice versa. Binary addition and subtraction (1's and 2's complement methods).
Logic gates: OR,AND,NOT gates, truth tables, realization of these gates using discrete components. NAND, NOR as universal gates, Exclusive – OR gate, De Morgan's Laws – statement and proof, Half and Full adders. Parallel adder circuits.

Reference :

1. Physics for Biology & Premedical Students by D.M.Burns and S.G.G. Mac . Donald (Addissan Wisley).
2. Concepts of Modern Physics by A. Beiser (Mc Graw Hill)
3. Perspsctives of Modern Physics By A. Beiser (Mc Graw Hill)
4. Principals of Electronicsby Behta (S. Chand & Company)
5. Electronics Made Simple by Jacabowits.
6. digital principles and applications by A.P.Malvino and D.P.Leach.McGraw Hill Education.

B.Sc. PHYSICS SYLLUBUS UNDER CBCS 1111

For Mathematics Combinations

B.Sc. 1st Semester Physics

Paper I: Mechanics& Properties of Matter

w.e.f. 2015-16

Work load:60 hrs per semester 4 hrs/week

UNIT-I (10 hrs)

1. Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II (10 hrs)

2. Mechanics of particles

Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering-derivation.

UNIT-III (16 hrs)

3. Mechanics of Rigid bodies

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications, precession of a top, Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media

Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT-IV (12Hrs)

5. Central forces

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equatglobal ion of motion under a central force.Derivation of Kepler’s laws.Motion of satellites, idea of Global Positioning System (GPS).

UNIT-V (12 hrs)

6. Special theory of relativity

Galilean relativity, absolute frames.Michelson-Morley experiment, negative result.Postulates of special theory of relativity.Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.Concept of four-vector formalism.

REFERENCE BOOKS:

1. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
2. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
3. Unified Physics, Vol. 1, S.L. Gupata & S. Guptha, Jai Prakash Nath & Co, Meerut.

4. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
5. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
6. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.

Practical paper 1: Mechanics & Properties of Matter

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Viscosity of liquid by the flow method (Poiseuille's method)
2. Young's modulus of the material of a bar (scale) by uniform bending
3. Young's modulus of the material a bar (scale) by non- uniform bending
4. Surface tension of a liquid by capillary rise method
5. Determination of radius of capillary tube by Hg thread method
6. Viscosity of liquid by Searle'sviscometer method
7. Bifilar suspension –moment of inertia of a regular rectangular body.
8. Determination of moment of inertia using Fly-wheel
9. Determination of the height of a building using a sextant.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Paper III: Wave Optics **3311**
(For Maths Combinations)
III SEMESTER

Work load:60 hrs per semester **4 hrs/week**

UNIT-I (8 hrs)

1. Aberrations:

Introduction – monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet.Achromatism for two lenses (i)in contact and (ii) separated by a distance.

UNIT-II (14hrs)

2. Interference

Principle of superposition – coherence-temporal coherence and spatial coherence-conditions for interference of light.Fresnel's biprism-determination of wavelength of light –change of phase on reflection.Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) –colors of thin films-

Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light. Michelson interferometer, Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.

UNIT-III (14hrs)

3. Diffraction

Introduction,distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction –Diffraction due to single slit-Fraunhoffer diffraction due to double slit-Fraunhoffer diffraction pattern with N slits (diffraction grating).Resolving power of grating, Determination of wavelength of light in normal incidence and minimum deviation methods using diffraction grating,

Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-difference between interference and diffraction.

UNIT-IV(10 hrs)

4.Polarisation:

Polarized light: methods of polarization polarization by reflection, refraction, double refraction, scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer-Quarter wave plate, Half wave plate-optical activity, determination of specific rotation by Laurent's half shade polarimeter-Babinet's compensator - idea of elliptical and circular polarization

UNIT-V (14hrs)

5. Lasers and Holography

Lasers: introduction,spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein coefficients-Types of lasers-He-Ne laser, Ruby laser- Applications of lasers.Holography: Basic principle of holography-Gabor hologram and its limitations, Applications of holography.

6. Fiber Optics

Introduction- different types of fibers, rays and modes in an optical fiber, fiber material,principles of fiber communication (qualitative treatment only), advantages of fiber optic communication.

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
3. Unified Physics Vol.II Optics & Thermodynamics – Jai Prakash Nath&Co.Ltd., Meerut
4. Optics,F..A. Jenkins and H.G. White, Mc Graw-Hill
5. Optics, AjoyGhatak,Tata Mc Graw-Hill.
6. Introduction of Lasers – Avadhanulu, S.Chand& Co.
7. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper III: Wave Optics

Work load:30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Resolving power of grating.
3. Study of optical rotation –polarimeter.
4. Dispersive power of a prism.
5. Determination of wavelength of light using diffraction grating-minimum deviation method.
6. Determination of wavelength of light using diffraction grating-normal incidence method.
7. Resolving power of a telescope.
8. Refractive index of a liquid-hallow prism
9. Determination of thickness of a thin wire by wedge method
10. Determination of refractive index of liquid-Boy's method.

Paper V: Electricity, Magnetism& Electronics 55111
(For Maths Combinations)
V Semester

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (12 hrs)

1. **Electric field intensity and potential:**
   Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii)charged spherical shell and uniformly charged sphere.
2. **Dielectrics:**
   Electric dipolemoment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility.

UNIT-II (12 hrs)

3. **Electric and magnetic fields**
   Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid — Hall effect – determination of Hall coefficient and applications.
4. **Electromagnetic induction**
   Faraday's law-Lenz's law- Self and mutual inductance , calculation of self inductance of a long solenoid, energy stored in magnetic field.

UNIT-III (12 hrs)

5. **Alternating currents and electromagnetic waves**
   Alternating current - Relation between current and voltage in LR and CR circuits, vector diagrams, LCR series and parallel resonant circuit, Q –factor.
6. **Maxwell's equations**
   Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation) .

UNIT-IV (12 hrs)

7. **Basic electronics:**
   PN juction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics

UNIT-V: (12 hrs)

8. **Digital electronics**
   Number systems - Conversion of binary to decimal system and vice versa.Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder.

REFERENCE BOOKS

1. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
2. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
3. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
4. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
5. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition.

Practical Paper V:Electricity, Magnetism & Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvonometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –sonometer.
4. Verification of Kirchoff's laws and maximum power transfer theorem.
5. Field along the axis of a circular coil carrying current.
6. PN Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor CE Characteristics- Determination of hybrid parameters
9. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
10. Verification of De Morgan's Theorems.

Paper VI: Modern Physics 55112
(For Maths Combinations)
V Semester
(w. e. f 2017-2018)

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (12 hrs)

1. Atomic and molecular physics

Introduction –Drawbacks of Bohr's atomic model- Sommerfeld's elliptical orbits-relativistic correction (no derivation).Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and j- j coupling schemes. Zeeman effect and its experimental arrangement.

Raman effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

UNIT-II (12 hrs)

2. Matter waves & Uncertainty Principle

Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves - Davisson and Germer experiment –Heisenberg's uncertainty principle for position and momentum (x and p), & energy and time (E and t). Consequence of Uncertain Principal- γ Ray microscope. Single slit Experiment.

UNIT-III (12 hrs)

3. Quantum (wave) mechanics

Basic postulates of quantum mechanics-Schrodinger time independent and time dependent wave equations-derivations . Application of Schrodinger wave equation to particle in one dimensional infinite box.

UNIT-IV(12 hrs)

4. General Properties of Nuclei

Basic ideas of nucleus -size, mass, charge density (matter energy), binding energy, angular momentum, parity, magnetic moment, electric moments. Liquid drop model and Shell model (qualitative aspects only).

5. Radioactivity decay:

Alpha decay: basics of α-decay processes. Theory of α-decay, Gamow's theory, Geiger Nuttal law.β-decay.

UNIT-V (12 hrs)

6. Crystal Structure

Diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

7. Superconductivity:

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - BCS theory (elementary ideas only) - applications of superconductors.

REFERENCE BOOKS

1. BSc Physics, Vol.4, Telugu Akademy, Hyderabad
2. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
3. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
4. Modern Physics by G. Aruldhas & P. Rajagopal. Eastern Economy Edition.
5. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
6. Quantum Mechanics, Mahesh C Jain, Eastern Economy Edition.
7. Nuclear Physics, Irving Kaplan, Narosa publishing House.
8. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
9. Elements of Solid State Physics, J.P.Srivastava, Prentice Hall of India Pvt., Ltd.
10. Solid State Physics, A.J. Dekker, McMillan India.

Practical Paper VI:Modern Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Study of absorption of α-rays.
5. Study of absorption of β-rays.
6. Determination of Range of β-particles.
7. Determination of M & H.
8. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
9. Energy gap of a semiconductor using junction diode.
10. Energy gap of a semiconductor using thermister.

B.Sc. Physics under CBCS for Non-Mathematics Combinations 1118

B.Sc. 1st Semester Physics

Paper I: Mechanics & Properties of Matter

w.e.f. 2015-16

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I(16 hrs)

1. Mathematical Background

Scalars and vectors –vector addition-scalar and vector products of vector and their physical significance-vector calculus-gradient of a scalar point function-divergence and curl of vector-statements of Stokes and Gauss theorems -examples (no derivations).

2. Motion of system

Collisions- Elastic and inelastic collisions-Collisions in one and two dimension-Rocket propulsion-Center of mass-Motion of the centre of mass-Impact parameter-Scattering cross-section, Rutherford scattering (No derivation-Qualitative ideas only)

UNIT-II(12 hrs)

3. Mechanics of Rigid body

Rigid body, rotational kinematic relations Rotational kinetic energy and moment of inertia - moment of inertia in simple cases (Rod, disc, sphere and cylinder)- No derivations. Parallel& Perpendicular axes theorems-Torque-relation between torque and angular momentum.

Angular momentum of a particle-Torque and angular momentum for a system of particles-conservation of angular momentum-Translation and rotational motion of system-Elementary ideas about gyroscopic motion (No derivation – Qualitative ideas only)-Precession of the equinoxes.

UNIT-III(10 hrs)

4. Central forces

Central force- Definition& examples- General Characteristics of central forces-Conservative nature of central forces, Planetary motion-Kepler's laws (Statements & Explanation), Newton's law of gravitation from Kepler's law, Geostationary Satellite Motion.Uses of communication satellites.

UNIT-IV(10 hrs)

5. Fluid Flow

The flow of ideal fluids Stream line motion -Equation of continuity –Bernoulli's equation-Simple applications - Torricelli's theorem-The Venturimeter-Pitot's tube-Viscosity and the flow of real fluids- Poiseuille's equation.

UNIT-V (12 hrs)

6. Relativistic effects

Moving reference frames-Inertial and Non-inertial reference frames-Galilean relativity – Special theory of relativity-Statements of the two basic postulates- (Elementary treatment and application only) Lorentz transformation equations-length contraction-time dilation-addition of velocities-Momentum and relativistic mass- Mass –Energy equation, rest mass & momentum of a particle.

REFERENCE BOOKS:

1. BSc Physics, Vol.1 -Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.I Mechanics,Waves and Oscillations – Jai Prakash Nath&Co.Ltd., Meerut.
4. Properties of Matter - D.S. Mathur, S.Chand& Co, New Delhi ,11thEdn., 2000
5. Properties of Matter - Brijlal&Subrmanyam ,S.Chand&Co. 1982

Practical paper 1: Mechanics & Properties of Matter

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Viscosity of liquid by the flow method (Poiseuille's method)
2. Young's modulus of the material of a bar (scale) by uniform bending
3. Young's modulus of the material a bar (scale) by non- uniform bending
4. Surface tension of a liquid by capillary rise method
5. Determination of radius of capillary tube by Hg thread method
6. Viscosity of liquid by Searle'sviscometer method
7. Bifilar suspension –moment of inertia of a regular rectangular body.
8. Determination of moment of inertia using Fly-wheel
9. Determination of the height of a building using a sextant.
10. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Paper III: Optics **3318**

(For Non- Maths Combinations)

III SEMESTER

w.e.f. 2015-16(Revised in April, 2016)

Work load: 60 hrs per semester **4 hrs/week**

UNIT –I(10 hrs)

1. Geometric optics

Aberrations in lenses-Chromatic Aberration-Achromatic Combination of lenses-Monochromatic defects-Spherical aberration-Astigmatism-Coma-Curvature and Distortion-Minimizing aberration.

UNIT-II(13 hrs)

2. Interference

The superstition principle, Condition for Interference, Classification of Interferences methods-Young's double slit experiment-Theory. Interference with white light and appearance of Young's interference fringes-Intensity in interference pattern-Optical Path length, Lloyd's single mirror-Phase change on reflection, Interference due to plane parallel wedge shaped films, Colours in thin films-Newton rings, Determination of wavelength of light. Michelson's interferometer.

UNIT-III(12 hrs)

3. Diffraction

The Fresnel and Fraunhoffer diffraction phenomena-Fraunhoffer diffraction of single Slit normal incidence and oblique incidence – Resolving power –limits of resolution for telescopes and microscope- Fraunhoffer diffraction by double slit-Intensity-pattern-Diffraction grating- Wavelength determination (Normal incidence and Minimum deviation).

UNIT-IV(13hrs)

4. Polarization

Types of Polarized light-Polarization by reflection, Brewster's law-Dichroism the Polaroid-double refraction- the calcite crystal-the principal plane-O and E rays-the Nicol Prism, Polariserand Analyser, Law of Malus –the quarter wave plate and halfwave plate Plane, Circularly, elliptically polarized light-Production and analysis -Optical activity-Specific rotatory power –Polarimeter.

UNIT V: (12 hrs)

5. Holography & Fiber Optics

Holography: Basic principle of holography-Gabor hologram and its limitations, applications of holography. Introduction- different types of fibres, rays and modes in an optical fibre, fibre material, principles of fiber communication (qualitative treatment only), applications.

REFERENCE BOOKS

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.II, Optics and Thermodynamics,*Jai Prakash Nath&Co.Ltd., Meerut*.
4. Optics, Ajoy Ghatak, Tata Mc Graw-Hill.
5. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication
6. Introduction of Lasers – Avadhanulu, S.Chand& Co.
7. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper III: Optics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Determination of radius of curvature of a given convex lens-Newton's rings.
2. Resolving power of grating.
3. Study of optical rotation –polarimeter.
4. Dispersive power of a prism.
5. Determination of wavelength of light using diffraction grating- minimum deviation method.
6. Determination of wavelength of light using diffraction grating-normal incidence method.
7. Resolving power of a telescope.
8. Refractive index of a liquid-hallow prism
9. Determination of thickness of a thin fiber by wedge method
10. Determination of refractive index of liquid-Boy's method.

Paper V : Electricity, Magnetism& Electronics **55181**
(For Non-Maths Combinations)
V Semester

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(15 hrs)

1. Electric field and potential

Coulomb's law – electric field and intensity of electric field –intensity of electric field due to i) a point charge–electric dipole and dipole moment. Electric lines of force, Electric flux. Gauss's law statement and its proof- applications of Gauss Law to (1) Uniformly charged sphere (2) an infinite conducting sheet of charge (No Derivation- qualitative ideas only). Electrical potential – equi-potential surfaces- potential due to i) a point charge, ii)charged spherical shell.Equi-potential surfaces with examples.

UNIT-II(10 hrs)

2. Capacitance and dielectrics

Derivation of expression for capacity due to i) a parallel plate capacitor with and without dielectric, ii) a spherical capacitor. Energy stored in a capacitor, electric capacitance. Electric dipole moment Di-electrics with examples, effect of electric field-electric displacement D, electric polarization P, permeability &susceptibility (Definitions only) – relation between D,E and P. Dipolemoment of heart.

UNIT-III (10 hrs)

3. Current electricity

Current and current density, drift velocity expression, Kirchhoff's laws –statement and explanation and application to Wheatstone bridge, sensitivity of Wheatstone bridge, Carey-Foster's bridge- experimentalmeasurement of temperature coefficient of resistance- strain gauge-piezoelectric transducers (applications only)

UNIT-IV (15 hrs)

5. Electromagnetism

Magnetic induction B, magnetic flux – Biot –Savart's law, magnetic induction due to (i) a long straight conductor carrying current (ii) on the axis of a circular coil carrying current, Hall effect and its importance-electromagnetic pumping. Faraday's law of electromagnetic induction, Lenz's law - Construction, theory and working of a Moving Coil Ballistic Galvanometer,application of B.G. damping correction, Self induction, Mutual induction and their units- Electromagnetic measurement of blood flow.

UNIT-V(12 hrs)

6. Basic Electronics

PN junction diode, Zener diode and its V-I characteristics, half and full wave rectifiers(semiconductor type) (working qualitative ideas only). Action of filters- Land π type.PNP and NPN transistors and charactrestics,Configurations Transistor configurations – CE transistor characteristics – h-parameters

Number system, conversion of binary to decimal and vice versa, De Morgans's theorems statements - logic gates – verification of truth tables, NAND and NOR gates as universal gates, Half and Full adders.

REFERENCE BOOKS

1. B.Sc., Physics, Vol.3, Telugu Academy, Hyderabad
2. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath – S. Chand & Co.
3. Electricity and Magnetism, Brijlal and Subramanyam. RatanPrakashanMandir.
4. Physics for Biology & Premedical Students –DN Burns & SG MacDonald, Addison Wiley.
5. Principles of Electronics, V.K. Mehta, S.Chand & Co.,
6. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition.

Practical Paper V: Electricity, Magnetism& Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Figure of merit of a moving coil galvonometer.
2. LCR circuit series/parallel resonance, Q factor.
3. Determination of ac-frequency –sonometer.
4. Verification of Kirchoff's laws and maximum power transfer theorem.
5. Field along the axis of a circular coil carrying current.
6. PN Junction Diode Characteristics
7. Zener Diode Characteristics
8. Transistor CE Characteristics- Determination of hybrid parameters
9. Logic Gates- OR, AND,NOT and NAND gates. Verification of Truth Tables.
10. Verification of De Morgan's Theorems.

Paper VI: Modern Physics& Medical Physics **55182**
(For Non-Maths Combinations)
V Semester
(w. e. f 2017-2018)

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(10 hrs)

1. Spectroscopy

Introduction - Zeeman effect - Experimental verification – Paschen Back effect – Stark effect – Explanations (elementary ideas only) - Raman effect, hypothesis, classical and quantum theory of Raman effect. Experimental arrangement for Raman effect and its application.

UNIT-II (12 hrs)

1. Fundamentals of quantum mechanics

Photoelectric effect – Explanation through demonstration, Einstein's Photoelectric equation – its verification by Millikan's experiment –theory of Compton effect (no derivation) and its experimental verification –Bohr's theory of Hydrogen atom – Derivation of expression for energy levels and spectral series of Hydrogen atom, Frank Hertz experiment.

UNIT-III (10 hrs)

3. Matter Waves and uncertainty principle

Dual nature of radiation- de Broglie's theory of matter waves, expression for wavelength, properties of matter waves, Davisson and Germer experiment on electron diffraction – Discussion of results, Heisenberg's uncertainty principle for position and momentum (x and p), energy and time (E and t).Experimental illustrations of uncertainty principal - γ Ray microscope. Single slit Experiment.

UNIT-IV: (12 hrs)

4. Radioactivity and radiation protection

The nature of radioactive emissions, the law of Radioactive decay, derivation, decay constant, Half life and mean life periods - derivations, units of radio activity, Carbon and Uranium dating (explanation) - Age of earth and rocks, Radioactive isotopes as tracers, radio cardiography, Natural radioactivity, Biological effects of radiation, Radiation monitors**.**

UNIT-V (16 hrs)

6. Crystal Structure

Diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

7. Superconductivity:

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - BCS theory (elementary ideas only) - applications of superconductors.

REFERENCE BOOKS

1. B.Sc Physics, Vol.4, Telugu Academy, Hyderabad.
2. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
3. Physics for Biology & Premedical Students –D.N. Burns & SG Mac Donald, Addison Wiley.
4. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
5. Medical Physics, J.R. Cameron and J.G.Skofronick, Wiley (1978)
6. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)
7. Physics of Radiation Therapy : F M Khan - Williams and Wilkins, Third edition (2003)
8. Physics of the human body, Irving P. Herman, Springer (2007).
9. The Physics of Radiology-H E Johns and Cunningham.

Practical Paper VI: Modern Physics& Medical Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. e/m of an electron by Thomson method.
2. Determination of Planck's Constant (photocell).
3. Verification of inverse square law of light using photovoltaic cell.
4. Study of absorption of α-rays.
5. Study of absorption of β-rays.
6. Determination of Range of β-particles.
7. Determination of M & H.
8. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
9. Energy gap of a semiconductor using junction diode.

Paper II: Waves & Oscillations 2211
(For Maths Combinations)
II SEMESTER

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (12 hrs)

1. Simple Harmonic oscillations

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum-measurement of 'g', Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT-II (12 hrs)

2. Damped and forced oscillations

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT-III (10 hrs)

3. Complex vibrations

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.

UNIT-IV (17hrs)

4. Vibrating strings: 8 hrs

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. Energy transport and transverse impedance.

5. Vibrations of bars: 9 hrs

Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.

UNIT-V (9 hrs)

6. Ultrasonics: 9hrs

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves.Applications of ultrasonic waves.

REFERENCE BOOKS:

1. BSc Physics Vol.1, Telugu Academy, Hyderabad.
2. Waves and Oscillations. N. Subramanyam and Brijlal, Vikas Pulications.
3. Unified Physics Vol., Mechanics, Waves and Oscillations, Jai Prakash Nath&Co.Ltd.
4. Fundamentals of Physics. Halliday/Resnick/Walker ,Wiley India Edition 2007.
5. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy,Orient Longman.
6. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
7. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004
8. Introduction to Physics for Scientists and Engineers. F.J. Buche. McGraw Hill.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Volume resonator experiment
2. Determination of 'g' by compound/bar pendulum
3. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
4. Determination of the force constant of a spring by static and dynamic method.
5. Determination of the elastic constants of the material of a flat spiral spring.
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of frequency of a bar –Melde's experiment.
9. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
10. Formation of Lissajous figures using CRO.

Paper IV: Thermodynamics &Radiation Physics 4411
(For Maths Combinations)
IV SEMESTER

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (10 hrs)

1. Kinetic theory of gases

Introduction –Deduction of Maxwell's law of distribution of molecular speeds, experimental verification. Transport phenomena – Mean free path - Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT-II(12 hrs)

2. Thermodynamics

Introduction- Isothermal and adiabatic process- Reversible and irreversible processes-Carnnot's engine and its efficiency-Carnot's theorem-Second law of thermodynamics. Kelvin's and Claussius statements-Entropy, physical significance –Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of Universe– Temperature-Entropy (T-S) diagram and its uses - Change of entropy of a perfect gas-change of entropy when ice changes into steam.

UNIT-III(12 hrs)

3. Thermodynamic potentials and Maxwell's equations

Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius-Clayperon's equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and vander Waal's gas.

UNIT-IV(12 hrs)

4. Low temperature Physics

Introduction-Joule Kelvin effect-Porous plug experiment - Joule expansion-Distinction between adiabatic and Joule Thomson expansion-Expression for Joule Thomson cooling-Liquefaction of helium, Kapitza's method-Adiabatic demagnetization, Production of low temperatures -applications of substances at lowtemperature-effects of chloro and fluoro carbons on ozone layer.

UNIT-V(14 hrs)

5. Quantum theory of radiation

Blackbody-Ferry's black body-distribution of energy in the spectrum of black body-Wein's displacement law,Wein's law, Rayleigh-Jean's law-Quantum theory of radiation-Planck's law-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination – Angstrompyrheliometer-determination of solar constant, Temperature of Sun.

REFERENCE BOOKS:

1. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
2. Thermodynamics, R.C.Srivastava, S.K.Saha& Abhay K.Jain, Eastern Economy Edition.
3. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath&Co.Ltd., Meerut
4. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
5. Heat, Thermodynamics and Statistical Physics-N Brij Lal, P Subrahmanyam, PS Hemne, S.Chand& Co.,2012
6. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
7. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Paper IV: Thermodynamics & Radiation Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor-Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple - potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - thermistor.

Paper–VII-(A)Elective(Electronics) 611EL01

Semester –VI

Elective Paper –VII-(A):Analog and Digital Electronics

No. of Hours per week: 04 **Total Lectures:60**

Unit-I (14 Hours)

1. FET-Construction, Working, characteristics and uses; MOSFET-enhancement MOSFET, depletion MOSFET, construction and working , drain characteristics of MOSFET, applications of MOSFET
2. Photo electric devices: Structure and operation, characteristics, spectral response and application of LDR, LEDand LCD

Unit-II (10Hours)

3. Operational Amplifiers: Characteristics of ideal and practical Op-Amp (IC 741), Basic differential amplifiers, Op-Amp supply voltage, IC identification, Internal blocks of Op-Amp, its parameter off set voltages and currents, CMRR, slew rate, concept of virtualground.

Unit-III (10 Hours)

4. Applications of Op-Amp: Op-Amp as voltage amplifier, Inverting amplifier, Non-inverting amplifier, voltage follower, summing amplifier, difference amplifier, comparator, integrator, differentiator.

Unit-IV(14 Hours)

5. Data processing circuits: Multiplexers, De-multiplexers, encoders, decoders, Characteristics for Digital ICs -RTL, DTL, TTL, ECL CMOS (NAND & NOR Gates).
6. IC 555 Timer -Its pin diagram,internal architecture, Application as astablemultivibrator and mono stable multivibrator.

Unit-V (12 Hours)

7. Sequential digital circuits:Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave, Flip- flop, Conversion of Flip flops.
8. Code Converters: Design of code converter, BCD to 7 segment, binary/BCD to gray, gray to binary/BCD ,design of counters using state machine.

Reference Books

1. Digital Electronics by G.K.Kharate Oxford University Press
2. Unified Electronics by Agarwal and Agarwal.
3. Op- Amp and Linear ICs by Ramakanth A Gayekwad, 4th edition PHI
4. Digital Principles and Applications by Malvino and Leach, TMH, 1996, 4th edition.
5. Digital Circuit design by Morris Mano,PHI
6. Switching Theory and Logic design by A.AnandKumar ,PHI
7. operations amplifier by SV Subramanyam.

Elective Paper-VII Practical: Analog and Digital Electronics
2hrs/Week

Minimum of 6 experiments to be done and recorded

1) Characteristics of FET
2) Characteristics of MOSFET
3) Characteristics of LDR
4) Characteristics of Op-amp.(IC741)
5)Op-Amp as amplifier/inverting amplifier
6) Op-Amp as integrator/differentiator
7) Op-Amp as summing amplifier/difference amplifier
8) IC 555 as astable multivibrator
9) IC 555 as monostable amplifier
10) Master slave flip-flop
11) JK flip-flop

Semester –VI

Cluster Electives VIII-A 611CLA01

Paper – VIII-A-1: Introduction to Microprocessors and Microcontrollers

No. of Hours per week: 04 Total Lectures:60

Unit – I (10Hours)

1. Introduction to microcontrollers:General purpose of computer systems,architecture of embedded system, classification, applications and purposes, challenges and designs, operational and non operational quality attributes, elemental description of embedded processors and micro controllers

Unit –II (10Hours)

2. Microprocessors:Organisation of microprocessorbased system, 8085 microprocessor,its pin diagram and architecture, concept of data bus, and address bus, 8085 programming, instruction classification, stacks and its implementation, hardware and software interrupts.

Unit– III (15Hours)

3. 8051 microcontroller:Introduction , block diagram, assembly language programming, programme counter, ROM memory, data types and directives, flag bits PSW register, jump, loop and call constructions

4. 8051 I/O Programming: Introduction to I/O port programming, pin out diagram, I/O port pin programming, bit manipulation, addressing modes, accessing memory, arithmetic and logic instructions.

Unit – IV (13 Hours)

5. Timers:Programming of 8051 timers, counter programming, interrupts, externalhardware interrupts**,** serial communication interrupts, interrupt priority.

6. Embedded system programming:Structure of programming, infinite loop, compiling, linking locating, down loading and debugging.

Unit –V (12Hours)

7. Embedded system design and development:Embedded system development environment, file type generated after cross compilation, dissembler, decompiler, simulator, emulator and debugging.

8. Embedded product life cycle:Embedded product development life cycle, trends in embedded industry.

Reference Books

1)Embedded Systems.. Architecture,programming and design, R Kamal, 2008, TMH

2) The 8051 micro controller and embedded systems using Assembly and C, M.A.Mazidi, J.G.Mazidi and R.D.McKinlay, second Ed., 2007 pearson Education India

3) Introduction to embedded systems K.V. Shibu, 1st edition, 2009 McGraw Hill

4) Micro Controllers in practice, I Susnea and Mitescu,2005,springer

Elective Paper-VIII-A-1 Practical: Introduction to Microprocessors and Microcontrollers 2hrs/Week

Minimum of 6 experiments to be done and recorded

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's.
5. Program to glow first four LED then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left.
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement, some information on LCD display, interfacing a keyboard.

Semester –VI **611CLA02**

Cluster Elective Paper VIII-A-2: Computational Methods and Programming

No. of Hours per week: 04 **Total Lectures:60**

UNIT-I (12hrs)

1. Fundamentals of C language: C character set-Identifiers and Keywords-Constants -Variables-Data types-Declarations of variables-Declaration of storage class-Defining symbolic constants-Assignment statement.
2. Operators: Arithmetic operators-Relational operators-Logic operators-Assignment operators-Increment and decrement operators-Conditional operators.

UNIT-II (12hrs)

3. Expressions and I/O Statements: Arithmetic expressions-Precedence of arithmetic operators-Type converters in expressions-Mathematical (Library) functions - Data input and output-The getchar and putchar functions-Scanf-Printf simple programs.
4. Control statements:If -Else statements -Switch statements - The operators - GO TO - While, Do - While, FOR statements - BREAK and CONTINUE statements.

UNIT-III (12hrs)

5. Arrays: One dimensional and two dimensional arrays - Initialization - Type declaration - Inputting and outputting of data for arrays - Programs of matrices addition, subtraction and multiplication
6. User defined functions: The form of C functions - Return values and their types - Calling a function - Category of functions. Nesting of functions.Recursion.ANSI C functions- Function declaration. Scope and life time of variables in functions.

UNIT-IV (12hrs)

7. Linear and Non - Linear equations: Solution of Algebra and transcendental equations-Bisection, Falsi position and Newton-Rhapson methods-Basic principles-Formulae-algorithms
8. Simultaneous equations: Solutions of simultaneous linear equations-Guass elimination and Gauss Seidel iterative methods-Basic principles-Formulae – Algorithms.

UNIT-V (12hrs)

9. Interpolations: Concept of linear interpolation-Finite differences-Newton's and Lagrange's interpolation formulae-principles and Algorithms
10. Numerical differentiation and integration: Numerical differentiation-algorithm for evaluation of first order derivatives using formulae based on Taylor's series-Numerical integration-Trapezoidal and Simpson's 1/3 rule- Formulae-Algorithms.

Reference books:

1. Introductory methods of Numerical Analysis: Sastry
2. Numerical Methods: Balaguruswamy
3. Programming in ANSI C (TMH) : Balaguruswamy
4. Programming with 'C'- Byron Gottafried, Tata Mc Graw Hill

Elective PaperVIII-A-2: Practical: Computational Methods and Programming
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Write a program that reads an alphabet from keyboard and display in the reverse order.
2. Write a program to read and display multiplication of tables.
3. Write a program for converting centigrade to Fahrenheit temperature and Fahrenheit temperature centigrade.
4. Write a program to find the largest element in an array.
5. Write a program based on percentage calculation, the grade by entering the subject marks. (If percentage > 60 I class, if percentage between 50&60 II class, if percentage between 35&50 III class, if percentage below 35 fail).
6. Write a program for generation of even and odd numbers up to 100 using while, do-while and for loop.
7. Write a program to solve the quadratic equation using Bisection method.
8. Write a program for integration of function using Trapezoidal rule.
9. Write a program for solving the differential equation using Simpson's $1/3^{rd}$ rule.

Semester –VI **611CLA03**

Cluster Elective Paper –VIII-A-3 :Electronic Instrumentation

No. of Hours per week: 04 **Total Lectures:60**

Unit – I (12Hours)

1. Basic of measurements:Instruments accuracy , precision , sensitivity , resolution range, errors in measurement, Multimeter , principles of measurement of dc voltage and dc currents, ac current and resistance, specifications of multimeter and their significance.

Unit -11 (10 Hours)

2. Electronic Voltmeter:Advantage over conventional multimeter for voltage measurement with respect to input impedence and sensitivity, principles of voltage measurement (block diagram only), specification of an electronic voltmeter/multimeter and their significance.

Unit– III (14 Hours)

3. CRO :Block diagram of basic CRO, construction of CRT, electron gun, electrostatic focusing and acceleration(only explanation) , time base operation, synchronization, front panel controls, specifications of CRO and their significance.

Applications CRO: Measurement of voltage ,dc and ac frequency , time period, special features of dual trace, digital storage oscilloscope, block diagram and principle of working.

Unit – IV (12 Hours)

4. Digital Multimeter:Block diagram,working, frequency and period measurement using universal counter, frequency counter ,accuracy and resolution.

5. Digital instruments:Principle and working of digitalinstruments, characteristics of a digital meter, working principle of digital voltmeter.

Unit – V (12 Hours)

6. Signal generators:Block diagram explanation, specifications of low frequency signal generators, pulse generator, function generator-working, Brief idea for testing, specifications. Distortion factor meter, wave analysis.

7. Bridges:Block diagram, working of basic LCR bridge – specifications – block diagram and working.

Reference Books

1. A text book in electrical technology by B.L.Thereja (S.Chand&Co)
2. Digital circuits and systems by Venugopal 2011 (Tata Mcgraw Hill)
3. Digital Electronics by SubrathaGhoshal 2012 (Cengage Learning)

Elective Paper-VIII-A-3: Practical: Electronic Instrumentation
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Study the loading effect of a multimeter by measuring voltage across alow and high resistance.
2. Study the limitations of a multimeter for measuring high frequency voltageand currents.
3. Measurement of voltage, frequency, time period and phase angle using CRO.
4. Measurement of time period and frequency using universal counter/frequency counter.
5. Measurement of rise, fall and delay times using a CRO.
6. Measurement of distortion of a RF signal generator using distortion factor meter.
7. Measurement of R, L and C using a LCR bridge/ universal bridge.

B.Sc. PHYSICS SYLLUBUS UNDER CBCS 1111-A

For Mathematics Combinations

B.Sc. 1st Semester Physics

Paper I: Mechanics& Properties of Matter

w.e.f. 2015-16

Work load:60 hrs per semester 4 hrs/week

UNIT-I (10 hrs)

1. Vector Analysis

Scalar and vector fields, gradient of a scalar field and its physical significance. Divergence and curl of a vector field with derivations and physical interpretation. Vector integration (line, surface and volume), Statement and proof of Gauss and Stokes theorems.

UNIT-II (10 hrs)

2. Mechanics of particles

Laws of motion, motion of variable mass system, Equation of motion of a rocket. Conservation of energy and momentum, Collisions in two and three dimensions, Concept of impact parameter, scattering cross-section, Rutherford scattering-derivation.

UNIT-III (16 hrs)

3. Mechanics of Rigid bodies

Definition of rigid body, rotational kinematic relations, equation of motion for a rotating body, angular momentum, Euler equations and its applications, precession of a top, Gyroscope, precession of the equinoxes.

4. Mechanics of continuous media

Elastic constants of isotropic solids and their relations, Poisson's ratio and expression for Poisson's ratio in terms of y, n, k. Classification of beams, types of bending, point load, distributed load, shearing force and bending moment, sign conventions.

UNIT-IV (12Hrs)

5. Central forces

Central forces, definition and examples, characteristics of central forces, conservative nature of central forces, conservative force as a negative gradient of potential energy, equatglobal ion of motion under a central force.Derivation of Kepler’s laws.Motion of satellites, idea of Global Positioning System (GPS).

UNIT-V (12 hrs)

6. Special theory of relativity

Galilean relativity, absolute frames.Michelson-Morley experiment, negative result.Postulates of special theory of relativity.Lorentz transformation, time dilation, length contraction, addition of velocities, mass-energy relation.Concept of four-vector formalism.

REFERENCE BOOKS:

7. B. Sc. Physics, Vol.1, Telugu Academy, Hyderabad
8. Fundamentals of Physics Vol. I - Resnick, Halliday, Krane ,Wiley India 2007
9. Unified Physics, Vol. 1, S.L. Gupata & S. Guptha, Jai Prakash Nath & Co, Meerut.

10. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
11. University Physics-FW Sears, MW Zemansky& HD Young,Narosa Publications, Delhi
12. Mechanics, S.G.Venkatachalapathy, Margham Publication, 2003.

Practical paper 1: Mechanics & Properties of Matter

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Viscosity of liquid by the flow method (Poiseuille's method)
12. Young's modulus of the material of a bar (scale) by uniform bending
13. Young's modulus of the material a bar (scale) by non- uniform bending
14. Surface tension of a liquid by capillary rise method
15. Determination of radius of capillary tube by Hg thread method
16. Viscosity of liquid by Searle'sviscometer method
17. Bifilar suspension –moment of inertia of a regular rectangular body.
18. Determination of moment of inertia using Fly-wheel
19. Determination of the height of a building using a sextant.
20. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Paper III: Wave Optics **3311-A**
(For Maths Combinations)
III SEMESTER

Work load:60 hrs per semester **4 hrs/week**

UNIT-I (8 hrs)

1. Aberrations:

Introduction – monochromatic aberrations, spherical aberration, methods of minimizing spherical aberration, coma, astigmatism and curvature of field, distortion. Chromatic aberration-the achromatic doublet.Achromatism for two lenses (i)in contact and (ii) separated by a distance.

UNIT-II (14hrs)

2. Interference

Principle of superposition – coherence-temporal coherence and spatial coherence-conditions for interference of light.Fresnel's biprism-determination of wavelength of light –change of phase on reflection.Oblique incidence of a plane wave on a thin film due to reflected and transmitted light (cosine law) –colors of thin films-

Interference by a film with two non-parallel reflecting surfaces (Wedge shaped film). Determination of diameter of wire, Newton's rings in reflected light. Michelson interferometer, Determination of wavelength of monochromatic light using Newton's rings and Michelson Interferometer.

UNIT-III (14hrs)

3. Diffraction

Introduction,distinction between Fresnel and Fraunhoffer diffraction, Fraunhoffer diffraction –Diffraction due to single slit-Fraunhoffer diffraction due to double slit-Fraunhoffer diffraction pattern with N slits (diffraction grating).Resolving power of grating, Determination of wavelength of light in normal incidence and minimum deviation methods using diffraction grating,

Fresnel's half period zones-area of the half period zones-zone plate-comparison of zone plate with convex lens-difference between interference and diffraction.

UNIT-IV(10 hrs)

4.Polarisation:

Polarized light: methods of polarization polarization by reflection, refraction, double refraction, scattering of light-Brewster's law-Mauls law-Nicol prism polarizer and analyzer-Quarter wave plate, Half wave plate-optical activity, determination of specific rotation by Laurent's half shade polarimeter-Babinet's compensator - idea of elliptical and circular polarization

UNIT-V (14hrs)

5. Lasers and Holography

Lasers: introduction,spontaneous emission, stimulated emission. Population Inversion, Laser principle-Einstein coefficients-Types of lasers-He-Ne laser, Ruby laser- Applications of lasers.Holography: Basic principle of holography-Gabor hologram and its limitations, Applications of holography.

6. Fiber Optics

Introduction- different types of fibers, rays and modes in an optical fiber, fiber material,principles of fiber communication (qualitative treatment only), advantages of fiber optic communication.

REFERENCE BOOKS:

8. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
9. A Text Book of Optics-N Subramanyam, L Brijlal, S.Chand& Co.
10. Unified Physics Vol.II Optics & Thermodynamics – Jai Prakash Nath&Co.Ltd., Meerut
11. Optics,F..A. Jenkins and H.G. White, Mc Graw-Hill
12. Optics, AjoyGhatak,Tata Mc Graw-Hill.
13. Introduction of Lasers – Avadhanulu, S.Chand& Co.
14. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper III: Wave Optics

Work load:30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Determination of radius of curvature of a given convex lens-Newton's rings.
12. Resolving power of grating.
13. Study of optical rotation –polarimeter.
14. Dispersive power of a prism.
15. Determination of wavelength of light using diffraction grating-minimum deviation method.
16. Determination of wavelength of light using diffraction grating-normal incidence method.
17. Resolving power of a telescope.
18. Refractive index of a liquid-hallow prism
19. Determination of thickness of a thin wire by wedge method
20. Determination of refractive index of liquid-Boy's method.

Paper V: Electricity, Magnetism& Electronics 55111-A
(For Maths Combinations)
V Semester

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (12 hrs)

2. Electric field intensity and potential:

Gauss's law statement and its proof- Electric field intensity due to (1) Uniformly charged sphere and (2) an infinite conducting sheet of charge. Electrical potential – equipotential surfaces- potential due to i) a point charge, ii)charged spherical shell and uniformly charged sphere.

2. Dielectrics:

Electric dipolemoment and molecular polarizability- Electric displacement D, electric polarization P – relation between D, E and P- Dielectric constant and susceptibility.

UNIT-II (12 hrs)

3. Electric and magnetic fields

Biot-Savart's law, explanation and calculation of B due to long straight wire, a circular current loop and solenoid — Hall effect – determination of Hall coefficient and applications.

4. Electromagnetic induction

Faraday's law-Lenz's law- Self and mutual inductance , calculation of self inductance of a long solenoid, energy stored in magnetic field.

UNIT-III (12 hrs)

5. Alternating currents and electromagnetic waves

Alternating current - Relation between current and voltage in LR and CR circuits, vector diagrams, LCR series and parallel resonant circuit, Q –factor.

6. Maxwell's equations

Idea of displacement current - Maxwell's equations (integral and differential forms) (no derivation), Maxwell's wave equation (with derivation) .

UNIT-IV (12 hrs)

7. Basic electronics:

PN juction diode, Zener diode, Tunnel diode, I-V characteristics, PNP and NPN transistors, CB, CE and CC configurations – Relation betweenα, β and γ - transistor (CE) characteristics

UNIT-V: (12 hrs)

8. Digital electronics

Number systems - Conversion of binary to decimal system and vice versa.Binary addition and subtraction (1's and 2's complement methods).Laws of Boolean algebra - De Morgan's laws-statement and proof, Basic logic gates, NAND and NOR as universal gates, exclusive-OR gate, Half adder and Full adder.

REFERENCE BOOKS

6. BSc Physics, Vol.3, Telugu Akademy, Hyderabad.
7. Electricity and Magnetism, D.N. Vasudeva. S. Chand & Co.
8. Electricity, Magnetism with Electronics, K.K.Tewari, R.Chand& Co.,
9. Principles of Electronics, V.K. Mehta, S.Chand& Co.,
10. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition.

Practical Paper V:Electricity, Magnetism & Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Figure of merit of a moving coil galvonometer.
12. LCR circuit series/parallel resonance, Q factor.
13. Determination of ac-frequency –sonometer.
14. Verification of Kirchoff's laws and maximum power transfer theorem.
15. Field along the axis of a circular coil carrying current.
16. PN Junction Diode Characteristics
17. Zener Diode Characteristics
18. Transistor CE Characteristics- Determination of hybrid parameters
19. Logic Gates- OR,AND,NOT and NAND gates. Verification of Truth Tables.
20. Verification of De Morgan's Theorems.

Paper VI: Modern Physics **55112-A**

(For Maths Combinations)

V Semester

(w. e. f 2017-2018)

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (12 hrs)

1. Atomic and molecular physics

Introduction –Drawbacks of Bohr's atomic model- Sommerfeld's elliptical orbits-relativistic correction (no derivation).Vector atom model and Stern-Gerlach experiment - quantum numbers associated with it. L-S and j- j coupling schemes. Zeeman effect and its experimental arrangement.

Raman effect, hypothesis, Stokes and Anti Stokes lines. Quantum theory of Raman effect. Experimental arrangement – Applications of Raman effect.

UNIT-II (12 hrs)

2. Matter waves & Uncertainty Principle

Matter waves, de Broglie's hypothesis - wavelength of matter waves, Properties of matter waves - Davisson and Germer experiment –Heisenberg's uncertainty principle for position and momentum (x and p), & energy and time (E and t). Consequence of Uncertain Principal- γ Ray microscope. Single slit Experiment.

UNIT-III (12 hrs)

3. Quantum (wave) mechanics

Basic postulates of quantum mechanics-Schrodinger time independent and time dependent wave equations-derivations . Application of Schrodinger wave equation to particle in one dimensional infinite box.

UNIT-IV(12 hrs)

4. General Properties of Nuclei

Basic ideas of nucleus -size, mass, charge density (matter energy), binding energy, angular momentum, parity, magnetic moment, electric moments. Liquid drop model and Shell model (qualitative aspects only).

5. Radioactivity decay:

Alpha decay: basics of α-decay processes. Theory of α-decay, Gamow's theory, Geiger Nuttal law.β-decay.

UNIT-V (12 hrs)

6. Crystal Structure

Diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

7. Superconductivity:

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - BCS theory (elementary ideas only) - applications of superconductors.

REFERENCE BOOKS

11. BSc Physics, Vol.4, Telugu Akademy, Hyderabad
12. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
13. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
14. Modern Physics by G. Aruldhas & P. Rajagopal. Eastern Economy Edition.
15. Concepts of Modern Physics by Arthur Beiser. Tata McGraw-Hill Edition.
16. Quantum Mechanics, Mahesh C Jain, Eastern Economy Edition.
17. Nuclear Physics, Irving Kaplan, Narosa publishing House.
18. Nuclear Physics, D.C.Tayal, Himalaya Publishing House.
19. Elements of Solid State Physics, J.P.Srivastava, Prentice Hall of India Pvt., Ltd.
20. Solid State Physics, A.J. Dekker, McMillan India.

Practical Paper VI:Modern Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. e/m of an electron by Thomson method.
12. Determination of Planck's Constant (photocell).
13. Verification of inverse square law of light using photovoltaic cell.
14. Study of absorption of α-rays.
15. Study of absorption of β-rays.
16. Determination of Range of β-particles.
17. Determination of M & H.
18. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
19. Energy gap of a semiconductor using junction diode.
20. Energy gap of a semiconductor using thermister.

B.Sc. Physics under CBCS for Non-Mathematics Combinations 1118-A

B.Sc. 1st Semester Physics

Paper I: Mechanics & Properties of Matter

w.e.f. 2015-16

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I(16 hrs)

1. Mathematical Background

Scalars and vectors –vector addition-scalar and vector products of vector and their physical significance-vector calculus-gradient of a scalar point function-divergence and curl of vector-statements of Stokes and Gauss theorems -examples (no derivations).

2. Motion of system

Collisions- Elastic and inelastic collisions-Collisions in one and two dimension-Rocket propulsion-Center of mass-Motion of the centre of mass-Impact parameter-Scattering cross-section, Rutherford scattering (No derivation-Qualitative ideas only)

UNIT-II(12 hrs)

3. Mechanics of Rigid body

Rigid body, rotational kinematic relations Rotational kinetic energy and moment of inertia - moment of inertia in simple cases (Rod, disc, sphere and cylinder)- No derivations. Parallel& Perpendicular axes theorems-Torque-relation between torque and angular momentum.

Angular momentum of a particle-Torque and angular momentum for a system of particles-conservation of angular momentum-Translation and rotational motion of system-Elementary ideas about gyroscopic motion (No derivation – Qualitative ideas only)-Precession of the equinoxes.

UNIT-III(10 hrs)

4. Central forces

Central force- Definition& examples- General Characteristics of central forces-Conservative nature of central forces, Planetary motion-Kepler's laws (Statements & Explanation), Newton's law of gravitation from Kepler's law, Geostationary Satellite Motion.Uses of communication satellites.

UNIT-IV(10 hrs)

5. Fluid Flow

The flow of ideal fluids Stream line motion -Equation of continuity –Bernoulli's equation-Simple applications - Torricelli's theorem-The Venturimeter-Pitot's tube-Viscosity and the flow of real fluids- Poiseuille's equation.

UNIT-V (12 hrs)

6. Relativistic effects

Moving reference frames-Inertial and Non-inertial reference frames-Galilean relativity – Special theory of relativity-Statements of the two basic postulates- (Elementary treatment and application only) Lorentz transformation equations-length contraction-time dilation-addition of velocities-Momentum and relativistic mass- Mass –Energy equation, rest mass & momentum of a particle.

REFERENCE BOOKS:

6. BSc Physics, Vol.1 -Telugu Academy, Hyderabad
7. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
8. Unified Physics Vol.I Mechanics,Waves and Oscillations – Jai Prakash Nath&Co.Ltd., Meerut.
9. Properties of Matter - D.S. Mathur, S.Chand& Co, New Delhi ,11thEdn., 2000
10. Properties of Matter - Brijlal&Subrmanyam ,S.Chand&Co. 1982

Practical paper 1: Mechanics & Properties of Matter

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Viscosity of liquid by the flow method (Poiseuille's method)
12. Young's modulus of the material of a bar (scale) by uniform bending
13. Young's modulus of the material a bar (scale) by non- uniform bending
14. Surface tension of a liquid by capillary rise method
15. Determination of radius of capillary tube by Hg thread method
16. Viscosity of liquid by Searle'sviscometer method
17. Bifilar suspension –moment of inertia of a regular rectangular body.
18. Determination of moment of inertia using Fly-wheel
19. Determination of the height of a building using a sextant.
20. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)

Paper III: Optics **3318-A**

(For Non- Maths Combinations)

III SEMESTER

w.e.f. 2015-16(Revised in April, 2016)

Work load: 60 hrs per semester **4 hrs/week**

UNIT –I(10 hrs)

1. Geometric optics

Aberrations in lenses-Chromatic Aberration-Achromatic Combination of lenses-Monochromatic defects-Spherical aberration-Astigmatism-Coma-Curvature and Distortion-Minimizing aberration.

UNIT-II(13 hrs)

2. Interference

The superstition principle, Condition for Interference, Classification of Interferences methods-Young's double slit experiment-Theory. Interference with white light and appearance of Young's interference fringes-Intensity in interference pattern-Optical Path length, Lloyd's single mirror-Phase change on reflection, Interference due to plane parallel wedge shaped films, Colours in thin films-Newton rings, Determination of wavelength of light. Michelson's interferometer.

UNIT-III(12 hrs)

3. Diffraction

The Fresnel and Fraunhoffer diffraction phenomena-Fraunhoffer diffraction of single Slit normal incidence and oblique incidence – Resolving power –limits of resolution for telescopes and microscope- Fraunhoffer diffraction by double slit-Intensity-pattern-Diffraction grating- Wavelength determination (Normal incidence and Minimum deviation).

UNIT-IV(13hrs)

4. Polarization

Types of Polarized light-Polarization by reflection, Brewster's law-Dichroism the Polaroid-double refraction- the calcite crystal-the principal plane-O and E rays-the Nicol Prism, Polariserand Analyser, Law of Malus –the quarter wave plate and halfwave plate Plane, Circularly, elliptically polarized light-Production and analysis -Optical activity-Specific rotatory power –Polarimeter.

UNIT V: (12 hrs)

5. Holography & Fiber Optics

Holography: Basic principle of holography-Gabor hologram and its limitations, applications of holography. Introduction- different types of fibres, rays and modes in an optical fibre, fibre material, principles of fiber communication (qualitative treatment only), applications.

REFERENCE BOOKS

8. BSc Physics, Vol.2, Telugu Academy, Hyderabad
9. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
10. Unified Physics Vol.II, Optics and Thermodynamics,*Jai Prakash Nath&Co.Ltd., Meerut*.
11. Optics, Ajoy Ghatak, Tata Mc Graw-Hill.
12. Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publication
13. Introduction of Lasers – Avadhanulu, S.Chand& Co.
14. Principles of Optics- BK Mathur, Gopala Printing Press, 1995

Practical Paper III: Optics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Determination of radius of curvature of a given convex lens-Newton's rings.
12. Resolving power of grating.
13. Study of optical rotation –polarimeter.
14. Dispersive power of a prism.
15. Determination of wavelength of light using diffraction grating- minimum deviation method.
16. Determination of wavelength of light using diffraction grating-normal incidence method.
17. Resolving power of a telescope.
18. Refractive index of a liquid-hallow prism
19. Determination of thickness of a thin fiber by wedge method
20. Determination of refractive index of liquid-Boy's method.

Paper V : Electricity, Magnetism& Electronics **55181-A**
(For Non-Maths Combinations)
V Semester

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(15 hrs)

1. Electric field and potential

Coulomb's law – electric field and intensity of electric field –intensity of electric field due to i) a point charge–electric dipole and dipole moment. Electric lines of force, Electric flux. Gauss's law statement and its proof- applications of Gauss Law to (1) Uniformly charged sphere (2) an infinite conducting sheet of charge (No Derivation- qualitative ideas only). Electrical potential – equi-potential surfaces- potential due to i) a point charge, ii)charged spherical shell.Equi-potential surfaces with examples.

UNIT-II(10 hrs)

2. Capacitance and dielectrics

Derivation of expression for capacity due to i) a parallel plate capacitor with and without dielectric, ii) a spherical capacitor. Energy stored in a capacitor, electric capacitance. Electric dipole moment Di-electrics with examples, effect of electric field-electric displacement D, electric polarization P, permeability &susceptibility (Definitions only) – relation between D,E and P. Dipolemoment of heart.

UNIT-III (10 hrs)

3. Current electricity

Current and current density, drift velocity expression, Kirchhoff's laws –statement and explanation and application to Wheatstone bridge, sensitivity of Wheatstone bridge, Carey-Foster's bridge- experimentalmeasurement of temperature coefficient of resistance- strain gauge-piezoelectric transducers (applications only)

UNIT-IV (15 hrs)

5. Electromagnetism

Magnetic induction B, magnetic flux – Biot –Savart's law, magnetic induction due to (i) a long straight conductor carrying current (ii) on the axis of a circular coil carrying current, Hall effect and its importance-electromagnetic pumping. Faraday's law of electromagnetic induction, Lenz's law - Construction, theory and working of a Moving Coil Ballistic Galvanometer,application of B.G. damping correction, Self induction, Mutual induction and their units- Electromagnetic measurement of blood flow.

UNIT-V(12 hrs)

6. Basic Electronics

PN junction diode, Zener diode and its V-I characteristics, half and full wave rectifiers(semiconductor type) (working qualitative ideas only). Action of filters- Land π type.PNP and NPN transistors and charactrestics,Configurations Transistor configurations – CE transistor characteristics – h-parameters

Number system, conversion of binary to decimal and vice versa, De Morgans's theorems statements - logic gates – verification of truth tables, NAND and NOR gates as universal gates, Half and Full adders.

REFERENCE BOOKS

7. B.Sc., Physics, Vol.3, Telugu Academy, Hyderabad
8. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath – S. Chand & Co.
9. Electricity and Magnetism, Brijlal and Subramanyam. RatanPrakashanMandir.
10. Physics for Biology & Premedical Students –DN Burns & SG MacDonald, Addison Wiley.
11. Principles of Electronics, V.K. Mehta, S.Chand & Co.,
12. Digital Principles and Applications, A.P. Malvino and D.P.Leach, Mc GrawHill Edition.

Practical Paper V: Electricity, Magnetism& Electronics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Figure of merit of a moving coil galvonometer.
12. LCR circuit series/parallel resonance, Q factor.
13. Determination of ac-frequency –sonometer.
14. Verification of Kirchoff's laws and maximum power transfer theorem.
15. Field along the axis of a circular coil carrying current.
16. PN Junction Diode Characteristics
17. Zener Diode Characteristics
18. Transistor CE Characteristics- Determination of hybrid parameters
19. Logic Gates- OR, AND,NOT and NAND gates. Verification of Truth Tables.
20. Verification of De Morgan's Theorems.

Paper VI: Modern Physics& Medical Physics **55182-A**
(For Non-Maths Combinations)
V Semester
(w. e. f 2017-2018)

Work load: 60 hrs per semester **4 hrs/week**

UNIT-1(10 hrs)

1. Spectroscopy

Introduction - Zeeman effect - Experimental verification – Paschen Back effect – Stark effect – Explanations (elementary ideas only) - Raman effect, hypothesis, classical and quantum theory of Raman effect. Experimental arrangement for Raman effect and its application.

UNIT-II (12 hrs)

2. Fundamentals of quantum mechanics

Photoelectric effect – Explanation through demonstration, Einstein's Photoelectric equation – its verification by Millikan's experiment –theory of Compton effect (no derivation) and its experimental verification –Bohr's theory of Hydrogen atom – Derivation of expression for energy levels and spectral series of Hydrogen atom, Frank Hertz experiment.

UNIT-III (10 hrs)

3. Matter Waves and uncertainty principle

Dual nature of radiation- de Broglie's theory of matter waves, expression for wavelength, properties of matter waves, Davisson and Germer experiment on electron diffraction – Discussion of results, Heisenberg's uncertainty principle for position and momentum (x and p), energy and time (E and t).Experimental illustrations of uncertainty principal - γ Ray microscope. Single slit Experiment.

UNIT-IV: (12 hrs)

4. Radioactivity and radiation protection

The nature of radioactive emissions, the law of Radioactive decay, derivation, decay constant, Half life and mean life periods - derivations, units of radio activity, Carbon and Uranium dating (explanation) - Age of earth and rocks, Radioactive isotopes as tracers, radio cardiography, Natural radioactivity, Biological effects of radiation, Radiation monitors**.**

UNIT-V (16 hrs)

6. Crystal Structure

Diffraction of X-rays by crystals, Bragg's law, experimental techniques, Laue's method and powder diffraction method.

7. Superconductivity:

Introduction - experimental facts, critical temperature - critical field - Meissner effect – Isotope effect - Type I and type II superconductors - BCS theory (elementary ideas only) - applications of superconductors.

REFERENCE BOOKS

10. B.Sc Physics, Vol.4, Telugu Academy, Hyderabad.
11. Molecular Structure and Spectroscopy by G. Aruldhas. Prentice Hall of India, New Delhi.
12. Physics for Biology & Premedical Students –D.N. Burns & SG Mac Donald, Addison Wiley.
13. Modern Physics by R. Murugeshan and Kiruthiga Siva Prasath. S. Chand & Co.
14. Medical Physics, J.R. Cameron and J.G.Skofronick, Wiley (1978)
15. Basic Radiological Physics Dr. K. Thayalan - Jayapee Brothers Medical Publishing Pvt. Ltd. New Delhi (2003)
16. Physics of Radiation Therapy : F M Khan - Williams and Wilkins, Third edition (2003)
17. Physics of the human body, Irving P. Herman, Springer (2007).
18. The Physics of Radiology-H E Johns and Cunningham.

Practical Paper VI: Modern Physics& Medical Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

10. e/m of an electron by Thomson method.
11. Determination of Planck's Constant (photocell).
12. Verification of inverse square law of light using photovoltaic cell.
13. Study of absorption of α-rays.
14. Study of absorption of β-rays.
15. Determination of Range of β-particles.
16. Determination of M & H.
17. Analysis of powder X-ray diffraction pattern to determine properties of crystals.
18. Energy gap of a semiconductor using junction diode.

Paper II: Waves & Oscillations **2218-A**
(For Non-Maths Combinations)
II SEMESTER

Work load:60 hrs per semester **4 hrs/week**

UNIT-I(15 hrs)

3. Oscillatory Motion

Simple harmonic motion-Equation of motion and solution-Simple harmonic motion from the standpoint of energy-The rotor diagram representation of simple harmonic motion-Compound pendulum-determination of g and k, torsional pendulum-determination of n, Combination of Simple harmonic motions along a line and perpendicular to each other-Lissajous figures-

UNIT-II(14 hrs)

2. Damped Oscillators

Damped vibrations - Explanation and examples - Forced vibrations – Explanation and examples, Resonance, examples -Sharpness of resonance Q-factor, Volume Resonator, Determination of frequency of a given tuning fork.

UNIT-III(11 hrs)

3. Wave Motion

Progressive waves-Equation of a progressive wave-sinusoidal waves-Velocity of waves in elastic media-Standing waves-Transverse vibrations of stretched strings, overtones and harmonics. Sonometer verification of laws of transverse vibrations in a stretched string, beats (qualitative analysis Only).

UNIT-IV(10 hrs)

4. Acoustics

Classification of sound, Characteristics of musical sound, Acoustics of Buildings, Reverberation, Sabine's formula (without derivation) Absorption coefficient, Factors affecting acoustics of buildings, Intensity of sound, Sound distribution in an auditorium.

UNIT-V(10 hrs)

5. Ultrasonics

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, Applications of ultrasonic waves.

REFERENCE BOOKS

1. BSc Physics, Vol.1 -Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.I, Mechanics,Waves and Oscillations – Jai Prakash Nath&Co.Ltd., Meerut.
4. Waves and Oscillations. S. Badami, V. Balasubramanian and K. Rama Reddy Orient Longman.
5. Waves and Oscillations. N. Subramaniyam and BrijlalVikas Publishing House Private Limited.
6. Acoustics – Waves and Oscillations, S.N.Sen, Wiley Estern Ltd.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Volume resonator experiment
2. Determination of 'g' by compound/bar pendulum
3. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
4. Determination of the force constant of a spring by static and dynamic method.
5. Determination of the elastic constants of the material of a flat spiral spring.
6. Coupled oscillators
7. Verification of laws of vibrations of stretched string –sonometer
8. Determination of frequency of a bar –Melde's experiment.
9. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
10. Formation of Lissajous figures using CRO.

Paper IV: Thermodynamics &Radiation Physics 4418-A
(For Non- Mathematics Combinations)
IV SEMESTER

Work load:60 hrs per semester 4 hrs/week

UNIT-I(12 hrs)

1. Kinetic theory of Gases

Zeroth law of thermodynamics,Measurment of temperature- resistance thermometry, thermoelectric theromometers-kinetic theory of gases- assumptions-pressure of an ideal gas-molecular interpretation of temperature- Maxwell's law of distribution of molecular speeds (no derivation)-experimental verification.

UNIT-II(12 hrs)

2. Thermodynamics

The first law of thermodynamics- work done in isothermal and adiabatic changes -Reversible and irreversible process-Carnot's cycle-Carnot's theorem - Second law of thermodynamics, Kelvin's and Claussius statements -Entropy, physical significance-Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of universe.

UNIT-III(12 hrs)

3. Low temperature Physics

Introduction-Joule Kelvin effect-porous plug experiment. Joule's expansion-Distinction between adiabatic and Joule Thomson expansion-Liquefaction of helium Kapitza's method-Adiabatic demagnetization-Production of low temperatures-Principle of refrigeration. applications of substances at low-temperature.

UNIT-IV(12 hrs)

4. Measurement, laws and theories of radiation

Black body-Ferry's black body-distribution of energy in the spectrum of Black body- Wein's law- Planck's radiation formula (no derivation)-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination-Angstrom Pyroheliometer-determination of solar constant, effective temperature of Sun.

UNIT-V(12 hrs)

5. Thermoelectricity

Seebeck effect variation of thermo – emf with temperature.Thermo electric series - Measurement of thermoemf using potentiometer,Law of intermediate metals and intermediate temperatures - Peltier effect, Demonstration Peltier coefficient. Thomson effect demonstration Thomson coefficient, Thermoelectric diagrams and their uses, Thermoelectric power. Application of Thermoelectric effects.

REFERENCE BOOKS

1. BSc Physics, Vol.2, Telugu Academy, Hyderabad
2. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
3. Unified Physics Vol.II, Optics and Thermodynamics,Jai Prakash Nath&Co.Ltd., Meerut.
4. Heat and Thermodynamics, N.Subramanyam and L.Brijlal, S.Chand& Co.
5. Electricity and Magnetism, N.Subramanyam and L.Brijlal, S.Chand& Co.
6. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Paper IV: Thermodynamics& Radiation Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

1. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
2. Thermal conductivity of bad conductor-Lee's method
3. Thermal conductivity of rubber.
4. Measurement of Stefan's constant.
5. Specific heat of a liquid by applying Newton's law of cooling correction.
6. Heating efficiency of electrical kettle with varying voltages.
7. Thermoemf- thermo couple potentiometer
8. Thermal behavior of an electric bulb (filament/torch light bulb)
9. Measurement of Stefan's constant- emissive method
10. Study of variation of resistance with temperature - thermistor.

Paper II: Waves & Oscillations **2211-A**
(For Maths Combinations)
II SEMESTER

Work load: 60 hrs per semester **4 hrs/week**

UNIT-I (12 hrs)

1. Simple Harmonic oscillations

Simple harmonic oscillator and solution of the differential equation-Physical characteristics of SHM, torsion pendulum-measurements of rigidity modulus, compound pendulum-measurement of 'g', Principle of superposition, beats, combination of two mutually perpendicular simple harmonic vibrations of same frequency and different frequencies. Lissajous figures.

UNIT-II (12 hrs)

2. Damped and forced oscillations

Damped harmonic oscillator, solution of the differential equation of damped oscillator. Energy considerations, comparison with un-damped harmonic oscillator, logarithmic decrement, relaxation time, quality factor, differential equation of forced oscillator and its solution, amplitude resonance and velocity resonance.

UNIT-III (10 hrs)

3. Complex vibrations

Fourier theorem and evaluation of the Fourier coefficients, analysis of periodic wave functions-square wave, triangular wave, saw tooth wave, simple problems on evolution of Fourier coefficients.

UNIT-IV (17hrs)

4. Vibrating strings: 8 hrs

Transverse wave propagation along a stretched string, general solution of wave equation and its significance, modes of vibration of stretched string clamped at ends, overtones and harmonics. Energy transport and transverse impedance.

5. Vibrations of bars: 9 hrs

Longitudinal vibrations in bars-wave equation and its general solution. Special cases (i) bar fixed at both ends (ii) bar fixed at the midpoint (iii) bar fixed at one end. Tuning fork.

UNIT-V (9 hrs)

6. Ultrasonics: 9hrs

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, determination of wavelength of ultrasonic waves.Applications of ultrasonic waves.

REFERENCE BOOKS:

9. BSc Physics Vol.1, Telugu Academy, Hyderabad.
10. Waves and Oscillations. N. Subramanyam and Brijlal, Vikas Pulications.
11. Unified Physics Vol., Mechanics, Waves and Oscillations, Jai Prakash Nath&Co.Ltd.
12. Fundamentals of Physics. Halliday/Resnick/Walker ,Wiley India Edition 2007.
13. Waves & Oscillations. S.Badami, V. Balasubramanian and K.R. Reddy,Orient Longman.
14. College Physics-I. T. Bhimasankaram and G. Prasad. Himalaya Publishing House.
15. Science and Technology of Ultrasonics- Baldevraj, Narosa, New Delhi,2004
16. Introduction to Physics for Scientists and Engineers. F.J. Buche. McGraw Hill.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Volume resonator experiment
12. Determination of 'g' by compound/bar pendulum
13. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
14. Determination of the force constant of a spring by static and dynamic method.
15. Determination of the elastic constants of the material of a flat spiral spring.
16. Coupled oscillators
17. Verification of laws of vibrations of stretched string –sonometer
18. Determination of frequency of a bar –Melde's experiment.
19. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
20. Formation of Lissajous figures using CRO.

Paper IV: Thermodynamics &Radiation Physics 4411-A
(For Maths Combinations)
IV SEMESTER

Work load: 60 hrs per semester 4 hrs/week

UNIT-I (10 hrs)

2. Kinetic theory of gases

Introduction –Deduction of Maxwell's law of distribution of molecular speeds, experimental verification. Transport phenomena – Mean free path - Viscosity of gases-thermal conductivity-diffusion of gases.

UNIT-II(12 hrs)

2. Thermodynamics

Introduction- Isothermal and adiabatic process- Reversible and irreversible processes-Carnnot's engine and its efficiency-Carnot's theorem-Second law of thermodynamics. Kelvin's and Claussius statements-Entropy, physical significance –Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of Universe– Temperature-Entropy (T-S) diagram and its uses - Change of entropy of a perfect gas-change of entropy when ice changes into steam.

UNIT-III(12 hrs)

3. Thermodynamic potentials and Maxwell's equations

Thermodynamic potentials-Derivation of Maxwell's thermodynamic relations-Clausius-Clayperon's equation-Derivation for ratio of specific heats-Derivation for difference of two specific heats for perfect gas.Joule Kelvin effect-expression for Joule Kelvin coefficient for perfect and vander Waal's gas.

UNIT-IV(12 hrs)

4. Low temperature Physics

Introduction-Joule Kelvin effect-Porous plug experiment - Joule expansion-Distinction between adiabatic and Joule Thomson expansion-Expression for Joule Thomson cooling-Liquefaction of helium, Kapitza's method-Adiabatic demagnetization, Production of low temperatures -applications of substances at lowtemperature-effects of chloro and fluoro carbons on ozone layer.

UNIT-V(14 hrs)

5. Quantum theory of radiation

Blackbody-Ferry's black body-distribution of energy in the spectrum of black body-Wein's displacement law,Wein's law, Rayleigh-Jean's law-Quantum theory of radiation-Planck's law-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination – Angstrompyrheliometer-determination of solar constant, Temperature of Sun.

REFERENCE BOOKS:

8. BSc Physics, Vol.2, Telugu Akademy, Hyderabad
9. Thermodynamics, R.C.Srivastava, S.K.Saha& Abhay K.Jain, Eastern Economy Edition.
10. Unified Physics Vol.2, Optics & Thermodynamics, Jai Prakash Nath&Co.Ltd., Meerut
11. Fundamentals of Physics. Halliday/Resnick/Walker.C. Wiley India Edition 2007
12. Heat, Thermodynamics and Statistical Physics-N Brij Lal, P Subrahmanyam, PS Hemne, S.Chand& Co.,2012
13. Heat and Thermodynamics- MS Yadav, Anmol Publications Pvt. Ltd, 2000
14. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Paper IV: Thermodynamics & Radiation Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
12. Thermal conductivity of bad conductor-Lee's method
13. Thermal conductivity of rubber.
14. Measurement of Stefan's constant.
15. Specific heat of a liquid by applying Newton's law of cooling correction.
16. Heating efficiency of electrical kettle with varying voltages.
17. Thermoemf- thermo couple - potentiometer
18. Thermal behavior of an electric bulb (filament/torch light bulb)
19. Measurement of Stefan's constant- emissive method
20. Study of variation of resistance with temperature - thermistor.

Elective VII (A): (Electronics) 611EL01-A

Semester –VI

Elective Paper –VII-(A) :Analog and Digital Electronics

No. of Hours per week: 04 **Total Lectures:60**

Unit-I (14 Hours)

9. FET-Construction, Working, characteristics and uses; MOSFET-enhancement MOSFET, depletion MOSFET, construction and working , drain characteristics of MOSFET, applications of MOSFET

10. Photo electric devices: Structure and operation, characteristics, spectral response and application of LDR, LEDand LCD

Unit-II (10Hours)

11. Operational Amplifiers: Characteristics of ideal and practical Op-Amp (IC 741), Basic differential amplifiers, Op-Amp supply voltage, IC identification, Internal blocks of Op-Amp, its parameter off set voltages and currents, CMRR, slew rate, concept of virtualground.

Unit-III (10 Hours)

12. Applications of Op-Amp: Op-Amp as voltage amplifier, Inverting amplifier, Non-inverting amplifier, voltage follower, summing amplifier, difference amplifier, comparator, integrator, differentiator.

Unit-IV(14 Hours)

13. Data processing circuits: Multiplexers, De-multiplexers, encoders, decoders, Characteristics for Digital ICs -RTL, DTL, TTL, ECL CMOS (NAND & NOR Gates).

14. IC 555 Timer -Its pin diagram,internal architecture, Application as astablemultivibrator and mono stable multivibrator.

Unit-V (12 Hours)

15. Sequential digital circuits:Flip-flops, RS, Clocked SR, JK, D, T, Master-Slave, Flip- flop, Conversion of Flip flops.

16. Code Converters: Design of code converter, BCD to 7 segment, binary/BCD to gray, gray to binary/BCD,design of counters using state machine.

Reference Books

1. Digital Electronics by G.K.Kharate Oxford University Press
2. Unified Electronics by Agarwal and Agarwal.
3. Op- Amp and Linear ICs by Ramakanth A Gayekwad, 4th edition PHI
4. Digital Principles and Applications by Malvino and Leach, TMH, 1996, 4th edition.
5. Digital Circuit design by Morris Mano,PHI
6. Switching Theory and Logic design by A.AnandKumar ,PHI
7. operations amplifier by SV Subramanyam.

Elective Paper-VII-A : Practical: Analog and Digital Electronics
2hrs/Week

Minimum of 6 experiments to be done and recorded

1) Characteristics of FET
2) Characteristics of MOSFET
3) Characteristics of LDR
4) Characteristics of Op-amp.(IC741)
5)Op-Amp as amplifier/inverting amplifier
6) Op-Amp as integrator/differentiator
7) Op-Amp as summing amplifier/difference amplifier
8) IC 555 as astable multivibrator
9) IC 555 as monostable amplifier
10) Master slave flip-flop
11) JK flip-flop

Semester –VI

Cluster Electives VIII-A 611CLA01-A

Paper – VIII-A-1: Introduction to Microprocessors and Microcontrollers

No. of Hours per week: 04 Total Lectures:60

Unit – I (10Hours)

1. Introduction to microcontrollers:General purpose of computer systems,architecture of embedded system, classification, applications and purposes, challenges and designs, operational and non operational quality attributes, elemental description of embedded processors and micro controllers

Unit –II (10Hours)

2. Microprocessors:Organisation of microprocessorbased system, 8085 microprocessor,its pin diagram and architecture, concept of data bus, and address bus, 8085 programming, instruction classification, stacks and its implementation, hardware and software interrupts.

Unit– III (15Hours)

3. 8051 microcontroller:Introduction , block diagram, assembly language programming, programme counter, ROM memory, data types and directives, flag bits PSW register, jump, loop and call constructions

4. 8051 I/O Programming: Introduction to I/O port programming, pin out diagram, I/O port pin programming, bit manipulation, addressing modes, accessing memory, arithmetic and logic instructions.

Unit – IV (13 Hours)

5. Timers:Programming of 8051 timers, counter programming, interrupts, externalhardware interrupts**,** serial communication interrupts, interrupt priority.

6. Embedded system programming:Structure of programming, infinite loop, compiling, linking locating, down loading and debugging.

Unit –V (12Hours)

7. Embedded system design and development:Embedded system development environment, file type generated after cross compilation, dissembler, decompiler, simulator, emulator and debugging.

8. Embedded product life cycle:Embedded product development life cycle, trends in embedded industry.

Reference Books

1)Embedded Systems.. Architecture,programming and design, R Kamal, 2008, TMH

2) The 8051 micro controller and embedded systems using Assembly and C, M.A.Mazidi, J.G.Mazidi and R.D.McKinlay, second Ed., 2007 pearson Education India

3) Introduction to embedded systems K.V. Shibu, 1st edition, 2009 McGraw Hill

4) Micro Controllers in practice, I Susnea and Mitescu,2005,springer

Elective Paper-VIII-A-1 Practical: Introduction to Microprocessors and Microcontrollers 2hrs/Week

Minimum of 6 experiments to be done and recorded

1. To find that the given numbers is prime or not.
2. To find the factorial of a number.
3. Write a program to make the two numbers equal by increasing the smallest number and decreasing the largest number.
4. Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's.
5. Program to glow first four LED then next four using TIMER application.
6. Program to rotate the contents of the accumulator first right and then left.
7. Program to run a countdown from 9-0 in the seven segment LED display.
8. To interface seven segment LED display with 8051 microcontroller and display 'HELP' in the seven segment LED display.
9. To toggle '1234' as '1324' in the seven segment LED.
10. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clockwise direction.
11. Application of embedded systems: Temperature measurement, some information on LCD display, interfacing a keyboard.

Semester –VI **611CLA02-A**

Cluster Elective Paper VIII-A-2: Computational Methods and Programming

No. of Hours per week: 04 **Total Lectures:60**

UNIT-I (12hrs)

1. Fundamentals of C language: C character set-Identifiers and Keywords-Constants -Variables-Data types-Declarations of variables-Declaration of storage class-Defining symbolic constants-Assignment statement.
2. Operators: Arithmetic operators-Relational operators-Logic operators-Assignment operators-Increment and decrement operators-Conditional operators.

UNIT-II (12hrs)

3. Expressions and I/O Statements: Arithmetic expressions-Precedence of arithmetic operators-Type converters in expressions-Mathematical (Library) functions - Data input and output-The getchar and putchar functions-Scanf-Printf simple programs.
4. Control statements:If -Else statements -Switch statements - The operators - GO TO - While, Do - While, FOR statements - BREAK and CONTINUE statements.

UNIT-III (12hrs)

5. Arrays: One dimensional and two dimensional arrays - Initialization - Type declaration - Inputting and outputting of data for arrays - Programs of matrices addition, subtraction and multiplication
6. User defined functions: The form of C functions - Return values and their types - Calling a function - Category of functions. Nesting of functions.Recursion.ANSI C functions- Function declaration. Scope and life time of variables in functions.

UNIT-IV (12hrs)

7. Linear and Non - Linear equations: Solution of Algebra and transcendental equations-Bisection, Falsi position and Newton-Rhapson methods-Basic principles-Formulae-algorithms
8. Simultaneous equations: Solutions of simultaneous linear equations-Guass elimination and Gauss Seidel iterative methods-Basic principles-Formulae – Algorithms.

UNIT-V (12hrs)

9. Interpolations: Concept of linear interpolation-Finite differences-Newton's and Lagrange's interpolation formulae-principles and Algorithms
10. Numerical differentiation and integration: Numerical differentiation-algorithm for evaluation of first order derivatives using formulae based on Taylor's series-Numerical integration-Trapezoidal and Simpson's 1/3 rule- Formulae-Algorithms.

Reference books:

1. Introductory methods of Numerical Analysis: Sastry
2. Numerical Methods: Balaguruswamy
3. Programming in ANSI C (TMH) : Balaguruswamy
4. Programming with 'C'- Byron Gottafried, Tata Mc Graw Hill

Elective PaperVIII-A-2: Practical: Computational Methods and Programming
2hrs/Week

Minimum of 6 experiments to be done and recorded

10. Write a program that reads an alphabet from keyboard and display in the reverse order.
11. Write a program to read and display multiplication of tables.
12. Write a program for converting centigrade to Fahrenheit temperature and Fahrenheit temperature centigrade.
13. Write a program to find the largest element in an array.
14. Write a program based on percentage calculation, the grade by entering the subject marks. (If percentage > 60 I class, if percentage between 50&60 II class, if percentage between 35&50 III class, if percentage below 35 fail).
15. Write a program for generation of even and odd numbers up to 100 using while, do-while and for loop.
16. Write a program to solve the quadratic equation using Bisection method.
17. Write a program for integration of function using Trapezoidal rule.
18. Write a program for solving the differential equation using Simpson's $1/3^{rd}$ rule.

Semester –VI **611CLA03-A**

Cluster Elective Paper –VIII-A-3 :Electronic Instrumentation

No. of Hours per week: 04 **Total Lectures:60**

Unit – I (12Hours)

1. Basic of measurements:Instruments accuracy , precision , sensitivity , resolution range, errors in measurement, Multimeter , principles of measurement of dc voltage and dc currents, ac current and resistance, specifications of multimeter and their significance.

Unit -11 (10 Hours)

2. Electronic Voltmeter:Advantage over conventional multimeter for voltage measurement with respect to input impedence and sensitivity, principles of voltage measurement (block diagram only), specification of an electronic voltmeter/multimeter and their significance.

Unit– III (14 Hours)

3. CRO :Block diagram of basic CRO, construction of CRT, electron gun, electrostatic focusing and acceleration(only explanation) , time base operation, synchronization, front panel controls, specifications of CRO and their significance.

Applications CRO: Measurement of voltage ,dc and ac frequency , time period, special features of dual trace, digital storage oscilloscope, block diagram and principle of working.

Unit – IV (12 Hours)

4. Digital Multimeter:Block diagram,working, frequency and period measurement using universal counter, frequency counter ,accuracy and resolution.

5. Digital instruments:Principle and working of digitalinstruments, characteristics of a digital meter, working principle of digital voltmeter.

Unit – V (12 Hours)

6. Signal generators:Block diagram explanation, specifications of low frequency signal generators, pulse generator, function generator-working, Brief idea for testing, specifications. Distortion factor meter, wave analysis.

7. Bridges:Block diagram, working of basic LCR bridge – specifications – block diagram and working.

Reference Books

4. A text book in electrical technology by B.L.Thereja (S.Chand&Co)
5. Digital circuits and systems by Venugopal 2011 (Tata Mcgraw Hill)
6. Digital Electronics by SubrathaGhoshal 2012 (Cengage Learning)

Elective Paper-VIII-A-3: Practical: Electronic Instrumentation
2hrs/Week

Minimum of 6 experiments to be done and recorded

1. Study the loading effect of a multimeter by measuring voltage across alow and high resistance.
2. Study the limitations of a multimeter for measuring high frequency voltageand currents.
3. Measurement of voltage, frequency, time period and phase angle using CRO.
4. Measurement of time period and frequency using universal counter/frequency counter.
5. Measurement of rise, fall and delay times using a CRO.
6. Measurement of distortion of a RF signal generator using distortion factor meter.
7. Measurement of R, L and C using a LCR bridge/ universal bridge.

Paper II: Waves & Oscillations 2218-A

(For Non-Maths Combinations)

II SEMESTER

Work load:60 hrs per semester 4 hrs/week

UNIT-I(15 hrs)

4. Oscillatory Motion

Simple harmonic motion-Equation of motion and solution-Simple harmonic motion from the standpoint of energy-The rotor diagram representation of simple harmonic motion-Compound pendulum-determination of g and k, torsional pendulum-determination of n, Combination of Simple harmonic motions along a line and perpendicular to each other-Lissajous figures-

UNIT-II(14 hrs)

2. Damped Oscillators

Damped vibrations - Explanation and examples - Forced vibrations – Explanation and examples, Resonance, examples -Sharpness of resonance Q-factor, Volume Resonator, Determination of frequency of a given tuning fork.

UNIT-III(11 hrs)

3. Wave Motion

Progressive waves-Equation of a progressive wave-sinusoidal waves-Velocity of waves in elastic media-Standing waves-Transverse vibrations of stretched strings, overtones and harmonics. Sonometer verification of laws of transverse vibrations in a stretched string, beats (qualitative analysis Only).

UNIT-IV(10 hrs)

4. Acoustics

Classification of sound, Characteristics of musical sound, Acoustics of Buildings, Reverberation, Sabine's formula (without derivation) Absorption coefficient, Factors affecting acoustics of buildings, Intensity of sound, Sound distribution in an auditorium.

UNIT-V(10 hrs)

5. Ultrasonics

Ultrasonics, properties of ultrasonic waves, production of ultrasonics by piezoelectric and magnetostriction methods, detection of ultrasonics, Applications of ultrasonic waves.

REFERENCE BOOKS

7. BSc Physics, Vol.1 -Telugu Academy, Hyderabad
8. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
9. Unified Physics Vol.I, Mechanics,Waves and Oscillations – Jai Prakash Nath&Co.Ltd., Meerut.
10. Waves and Oscillations. S. Badami, V. Balasubramanian and K. Rama Reddy Orient Longman.
11. Waves and Oscillations. N. Subramaniyam and BrijlalVikas Publishing House Private Limited.
12. Acoustics – Waves and Oscillations, S.N.Sen, Wiley Estern Ltd.

Practical Paper II: Waves & Oscillations

Work load: 30 hrs per semester **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Volume resonator experiment
12. Determination of 'g' by compound/bar pendulum
13. Simple pendulum normal distribution of errors-estimation of time period and the error of the mean by statistical analysis
14. Determination of the force constant of a spring by static and dynamic method.
15. Determination of the elastic constants of the material of a flat spiral spring.
16. Coupled oscillators
17. Verification of laws of vibrations of stretched string –sonometer
18. Determination of frequency of a bar –Melde's experiment.
19. Study of a damped oscillation using the torsional pendulum immersed in liquid-decay constant and damping correction of the amplitude.
20. Formation of Lissajous figures using CRO.

Paper IV: Thermodynamics &Radiation Physics 4418-A
(For Non- Mathematics Combinations)
IV SEMESTER

Work load:60 hrs per semester 4 hrs/week

UNIT-I(12 hrs)

1. Kinetic theory of Gases

Zeroth law of thermodynamics,Measurment of temperature- resistance thermometry, thermoelectric theromometers-kinetic theory of gases- assumptions-pressure of an ideal gas-molecular interpretation of temperature- Maxwell's law of distribution of molecular speeds (no derivation)-experimental verification.

UNIT-II(12 hrs)

2. Thermodynamics

The first law of thermodynamics- work done in isothermal and adiabatic changes -Reversible and irreversible process-Carnot's cycle-Carnot's theorem - Second law of thermodynamics, Kelvin's and Claussius statements -Entropy, physical significance-Change in entropy in reversible and irreversible processes-Entropy and disorder-Entropy of universe.

UNIT-III(12 hrs)

3. Low temperature Physics

Introduction-Joule Kelvin effect-porous plug experiment. Joule's expansion-Distinction between adiabatic and Joule Thomson expansion-Liquefaction of helium Kapitza's method-Adiabatic demagnetization-Production of low temperatures-Principle of refrigeration. applications of substances at low-temperature.

UNIT-IV(12 hrs)

4. Measurement, laws and theories of radiation

Black body-Ferry's black body-distribution of energy in the spectrum of Black body- Wein's law- Planck's radiation formula (no derivation)-Measurement of radiation-Types of pyrometers-Disappearing filament optical pyrometer-experimental determination-Angstrom Pyroheliometer-determination of solar constant, effective temperature of Sun.

UNIT-V(12 hrs)

5. Thermoelectricity

Seebeck effect variation of thermo – emf with temperature.Thermo electric series - Measurement of thermoemf using potentiometer,Law of intermediate metals and intermediate temperatures - Peltier effect, Demonstration Peltier coefficient. Thomson effect demonstration Thomson coefficient, Thermoelectric diagrams and their uses, Thermoelectric power. Application of Thermoelectric effects.

REFERENCE BOOKS

7. BSc Physics, Vol.2, Telugu Academy, Hyderabad
8. Physics for Biology and Premedical Students –D.N. Burns & SGG Mac Donald
9. Unified Physics Vol.II, Optics and Thermodynamics,Jai Prakash Nath&Co.Ltd., Meerut.
10. Heat and Thermodynamics, N.Subramanyam and L.Brijlal, S.Chand& Co.
11. Electricity and Magnetism, N.Subramanyam and L.Brijlal, S.Chand& Co.
12. University Physics, HD Young, MW Zemansky,FW Sears, Narosa Publishers, New Delhi

Practical Paper IV: Thermodynamics& Radiation Physics

Work load: 30 hrs **2 hrs/week**

Minimum of 6 experiments to be done and recorded

11. Specific heat of a liquid –Joule's calorimeter –Barton's radiation correction
12. Thermal conductivity of bad conductor-Lee's method
13. Thermal conductivity of rubber.
14. Measurement of Stefan's constant.
15. Specific heat of a liquid by applying Newton's law of cooling correction.
16. Heating efficiency of electrical kettle with varying voltages.
17. Thermoemf- thermo couple potentiometer
18. Thermal behavior of an electric bulb (filament/torch light bulb)
19. Measurement of Stefan's constant- emissive method
20. Study of variation of resistance with temperature - thermistor.