GOVT. D. B. GIRLS' P. G. (AUTO.) COLLEGE

RAIPUR CHHATTISGARH

DEPARTMENT OF PHYSICS

SYLLABUS OF B. Sc. PHYSICS

SESSION 2020 – 2021

DEPARTMENT OF PHYSICS

B. Sc. PHYSICS ANNUAL EXAMINATION 2020

THEORY

Class	No.	TITLE	MARKS	
			Max.	Min.
B. Sc I	Paper I	MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER	50	17
	Paper II	ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY	50	17
B. Sc II	Paper I	THERMODYNAMICS, KINETIC THEORY AND STATICAL PHYSICS	50	17
	Paper II	WAVES, ACOUSTICS & OPTICS	50	17
B. Sc III	Paper I	RELATIVITY, QUANTUM MECHANICS, ATOMIC, MOLECULAR AND NUCLEAR PHYSICS	50	17
	Paper II	SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS	50	17

PRACTICAL

Class	Practical	Max.	Min.
B. Sc. I	Group A and Group B	50	17
B. Sc. II	Group A and Group B	50	17
B. Sc. III	Group A and Group B	50	17

Department of Physics
Govt. D. B/ Girls P. G. College Raipur, C.G.

Class B. Sc. I

Paper I Maximum Marks - 50

Title - MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER

Paper II Maximum Marks – 50

Title - ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Practical – Maximum Marks - 50

Class B. Sc. II

Paper I Maximum Marks - 50

Title-THERMODYNAMICS, KINETIC THEORY AND STATICAL PHYSICS

Paper II Maximum Marks – 50

Title - Title: WAVES, ACOUSTICS & OPTICS

Practical – Maximum Marks - 50

Class B. Sc. III

Paper I Maximum Marks -50

Title - RELATIVITY, QUANTUM MECHANICS, ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

Paper II Maximum Marks – 50

Title - SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Practical – Maximum Marks - 50

GOVT. D. B. GIRLS' P. G. (AUTONOMOUS) COLLEGE RAIPUR, C. G.

Class B. Sc. III

SUBJECT – PHYSICS PAPER- I

RELATIVITY, QUANTUM MECHANICS, ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

Min. Marks : 17 **Max.Marks:50**

Unit-I

Reference system, inertial frames Gallilean invariance and conservation laws, propagation of light, Michelson-Morley experiment; search for ether.

Postulates for the special theory of relativity, Lorentz transformations, length contraction time dilation, velocity addition theorem, variation of mass with velocity, mass – energy equivalence, particle with zero rest mass ,Compton effect.

Unit- II

Origin of the quantum theory: Failure of classical physics to explain the phenomena such as black body spectrum, photoelectric effect.

Wave particle duality and uncertainty principle: de Broglie's hypothesis for matter waves; the concept of wave and group velocities, evidence for diffraction and interference of particles, experimental demonstration of matter waves. Davisson and Germer's experiment.

Consequence of de Broglie's concepts; quantization in hydrogen atom; energies of a particle in a box, wave packets.

Consequence of the uncertainty relation: gamma ray microscope, diffraction at a slit.

Unit – III

Quantum Mechanics: Schrodinger's equation. Postulatory basis of quantum mechanics; operators, expectation values, transition probabilities, applications to particle in a one and three dimensional boxes, harmonic oscillatorin one dimension, reflection at a step potential, transmission across a potential barrier.

Hydrogen atom: natural occurrence of n, l and m quantum numbers, the related physical quantities.

Unit – IV

Spectra of hydrogen, deuteron and alkali atoms, spectral terms, double fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules,

Discrete set of electronic energies of molecules, quantization of vibrational and rotational Energies, determination of internuclear distance, pure rotational and rotational vibrational spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic spectra.Raman effect, Stokes and anti – Stokes lines complimentary character of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

Unit - V

Interaction of charged particles and neutrons with matter, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chamber, Spark Chambers emulsions. Structure of nuclei, basic properties (I, μ, Q and binding energy), deuteron binding energy, p-p and n-p scattering and general concepts of nuclear forces. Beta decay, range of alpha particle, Geiger- Nuttal law. Gamow's explanation of beta decay, alpha decay and continuous and discrete spectra.

Nuclear reactions, channels, compound nucleus, direct reaction (concepts). Shell model: liquid drop model, fusion (concepts), energy production in stars by p-p and carbon- nitrogen cycles (concepts).

GOVT. D. B. GIRLS' P. G. (AUTONOMOUS) COLLEGE RAIPUR, C. G.

Class B. Sc. III

SUBJECT – PHYSICS PAPER- II

SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

Min. Marks : 17 **Max.Marks:50**

Unit-I

Amorphous and crystalline solids, elements of symmetry, seven system, Cubic lattices, Crystal planes, Miller indices, Laue's equations for X- ray diffraction. Bragg's law. Bonding in solids classification. Cohesive energy of solid.
Modelung constant, evaluation of parameters.
Specific heat of solids, classical theory (Dulong- Petit's law). Einstein's and Debye theories. Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin zone.

Unit- II

Free electron model of a metal, solution of one dimensional Schrodinger's equation in a constant potential. Density of states. Fermi energy , Energy bands in a solid (kronig – penny model without mathematical details). Metals, insulators and semiconductors. Hall effect.Die, Para and Ferromagnetism. Langevin's theory of die and para magnetism. Curie – Weiss's law. Qualitative description of Ferromagnetism (Magnetic domains), B – H curve and hysterisis loss.

Unit –III

Intrinsic semiconductors, Carrier concentration in thermal equilibrium, Fermi level, Impurity, semiconductor, donor and acceptor levels, Diode equation, junctions, junction breakdown, Depletion width and junction capacitance, abrupt junction, Tunnel diode , Zener diode. Light emitting diodes, solar cell, bipolar transistors, PNP and NPN transistors, characteristics of transistors, different configurations, current amplification factor, FET.

Unit – IV

Half and full wave rectifier, rectification efficiency, ripple factor, Bridge rectifier, filters, Inductor filter, T and л filters, Zener diode, regulated power supply.
Application of transistors. Bipolar transistor as amplifier. Single stage and CE small signal amplifiers, Emitter follower, Transistor as power amplifier, Transistor as oscillator. Wein bridge oscillator and Hartley oscillator.

Unit – V

Introduction to computer organization, time sharing and multiprogramming systems, window based word processing packages, MS Word.
Introduction to C programming and application to simple problems of arranging number in ascending/descending orders; sorting a given data in an array, solution of simultaneous equation.