Govt. Bilasa Girl's P.G. (Auto.) College

Bilaspur

SYLLABUS

B.Sc. Physics

Semester – I & II

2019-20

Govt. Bilasa Girls' P.G.(Auto.) College,

Link Road, Bilaspur (C.G.)

Phone No. 07752-224249, Website : www.bilasagirlscollege.ac.in

GUIDELINE ON SEMESTER SYSTEM

2019-20

(Three Year Degree Course)

1. **Duration –** Duration of course is of six semesters. Each semester is of six month durtion.
2. **Total Marks –** There will be only Honors Course of total 2800 marks.
3. **Grouping of subjects** – General group of three subjects are compulsory for all students of Science, and Computer Application. These are (a) General English (second and third semester) (b) General Hindi (Fourth and Fifth semester) (c) Environmental Studies (First semester) (d) Skill based course (sixth semester). Subject groups are as follows :

   A. B.Sc. Semester I to VI

   (i) Mathematics, Chemistry, Physics
   (ii) Mathematics, Computer Science, Physics
   (iii) Mathermatics, Information Technology, Physics
   (iv) Mathematics, Geology, Physics
   (v) Botany , Microbiology, Chemistry
   (vi) Botany, Biotechnology, Chemistry
   (vii) Botany, Microbiology, Chemistry
   (viii) Zoology, Biotechnology, Chemistry.
   (ix) Zoology, Microbiology, Chemistry
   (x) Zoology, Geology, Chemistry

   B. **B.Sc.- Honors Courses** (Additional One subject to be taken from third semester)

   (i) Mathematics
   (ii) Physics
   (iii) Chemistry
   (iv) Computer Science
   (v) Information Technology
   (vi) Geology
   (vii) Botany
   (viii) Zoology
   (ix) Biotechnology
   (x) Microbiology

4. **Marks Pattern –**

   (i) Each theory course paper will be of 100 (80 marks in external/semester end exam + 20 marks internal) marks for non practical subjects and of 75 marks for subjects having practical (60 marks in external/semester end exam + 15 marks internal)

   (ii) Each practical pape will be of 50 marks. Practical classes will be held round the year but examination shall be held only in even semester (i.e.in II, IV and VI semester)

5. **Theory Examinations** – Duration of Practical Examinations shall be of two & half hours.

6. **Practical Examinations** – Duration of Practical Examinations shall be of 4 hours.

7. **Admission Period** –

   (i) First semester admission should be completed within 15th July each year.

   (ii) Admission in other semester i.e. 2nd, 3rd, 4th, 5th, and 6th semester should be completed within 7 days after completion of examination on provisional basis. The provisional Admission should be regularized within seven days from the date of publication of results. Requests for permission for late Admission shall not be entertained.

8. **Schedule of Classes :**

   (i) 1st semester classes from 16th July.

   (ii) 3rd and 5th semester classes from 2nd July

   (iii) 2nd, 4th and 6th semester classes from 2nd January.

9. **Examination Schedule :** Tentative Schedules of examinations are as under :

   (i) Odd semester - 20th November to 20th December

   (ii) Even semester - 15th April to 14th May

10. **Examination Pattern (A) Theory –**

   (a) Questions will be asked Unit wise. Questions will be set from all Units covering the entire syllabi. There will be one alternative questions to be answered.

   (b) Five questions are to be answered each of 16 marks for subjects without practical and of 12 marks for subjects having practical.

   (c) There will be no separate distribution of objective type of questions but these will be included along with main questions.

   (d) Marks shall be distributed for a question like 1, 2, 3, ... for different portion and maximum marks shall be 16 for non practical subjects and 12 for subjects having practical in the following manner :-

Type of Question		Theory paper of Non- practical subjects (Apprx)	Theory Paper of Practical subjects (Apprx)
(a)	Objective type (in few words	2	2
(b)	Short Answer type (in few words)	4	4
(c)	Long Answer and Critical Type	10	6
	Total	**16**	**12**

   (e) In odd semester examination, a candidate shall appear in papers of odd semester(s) only. Similarly in even semester examinations, a candidate shall

appear in papers of even semester(s) only. Papers of odd and even semesters shall not be confined in one examination.

(f) Minimum passing marks for external/semester end theory and practical shall be 34%.

(g) There shall be provision of 3 grace marks and it would be distributed in maximum two theory/two practical/one theory paper(s).

(B) Practical

Work	Each pass paper
Laboratory note book/project	10
Viva voce	10
Experiments	30
Total	50

11. **Internal Assessment –** Internal Tests are compulsory for theory papers and must be held as per following calender :-

Odd Semester	1st Test – August,	2nd Test – October	01 Assignment
Even Semester	1st Test – February	2nd Test – March	01 Assignment

Each test/assignment will be of 20 marks for the subjects without practical and 15 marks for the subjects having practical. Average of the marks obtained in the best two tests/assignment shall be incorporated as the final mark. Qualifying mark is 40%. If a candidate is failed to attend the test of bonafide grounds, one special test may be arranged on production of relevant documents, before submission of application forms and fees to the office. The Unit tests/assignment marks to be sent to the exam cell of the college as per notification to be issued by the Principal/controller examination from time to time.

Marks	Non Practical subject		Practical Subject	
	External/ Semester end	Internal	External/ Semester end	Internal
Maximum Marks	80	20	60	15
Minimum Marks	28	08	21	06

12. Eligibility criteria for admission in semester and examinations.

(i) A candidate should have 75% of attendence both in theory and practical papers. 65% attendance may be considered only on special circumstances and on certification by the Principal of the college.

(ii) A candidate shall have to qualify in the internal tests securing at least 40% marks.

(iii) A candidate shall be allowed to appear in those papers only in which he/she has secured qualifying marks in internal test.

(iv) If a candidate after taking admission in 1st semester could not continue the classes or could not obtain eligibility cannot appear in the 1st semester examinations. In such cases the student will not be allowed to continue in

second semester and he/she has to continue the classes and obtain eligibility in 1st semester again in next academic year as ex-student.

13. **Lecture Periods/Classes :**

There shall be a minimum of 50-60 hours for theory papers in respective course. Minimum of 50-60 hours shall be for each practical paper. This shall be strictly adhered to.

14. **Promotion Rules :**

(a) A candidate is eligible to continue the second semester classes immediately after the 1st semester examinations and can appear in the 2nd semester examinations notwithstanding the number of arrer papers in 1st semester provided he/she must have apperaed in the 1st semester examinations.

(b) A candidate will be promoted to 3rd semester with not more than two back papers of 1st semester and he/she will continue to attend classes of 3rd semester provisionally. He/She will be allowed to get final admission in the 3rd semester with maximum of four back papers in all in 1st semester and 2nd semester.

(c) A candidate will be promoted to 4th semester with not more than two back papers of 2nd semester and he/she will continue to attend classes of 4th semester provisionally. He/She will be allowed to get final admission in the 4th semester with maximum of four back papers in all in 2nd semester and 3rd semester.

(d) A candidate will be promoted to 5th semester with not more than two back papers of 3rd semester and he/she will continue to attend classes of 5th semester provisionally. He/She will be allowed to get final admission in the 5th semester with any number of back papers of 4th semester and only two back papers of 3rd semester.

(e) A candidate will be promoted to 6th semester with not more than two back papers of 4th semester. He/She will be allowed to take admission finally in the 6th semester with any number of back papers of 5th semester and only two back papers of 4th semester.

15. **Other Guidelines :**

(i) There will be no provision for Revaluation, Supplementary or Betterment (Division Improvement).

(ii) A candidate has to clear all the papers within 12 semesters (six years) from the year of first admission in the programme.

(iii) A candidate will choose Honours subject just before the start of third semester from any one of the three elective subjects/courses selected by hie/her in the first semester. A candidate can change the Honours subject within 15 days from the date of admission in the third semester.

(iv) The system of Choice based credit system and Gradation system shall be introduced after its formal approval by the competent authorities.

16. **(A) For Honours Course** (Total Marks : 2800) of B.Sc.

17. **Result :- (A)** Each theory Paper (Practical Subject)

Each Theory Paper		Internal Assessment	
Full Marks	Minimum Passing Marks	Full Marks	Minimum Passing Marks
60	21	15	06

(B) Each Theory Paper (Non-Practical Subject) :

Each Theory Paper		Internal Assessment	
Full Marks	Minimum Passing Marks	Full Marks	Minimum Passing Marks
80	28	20	08

(C) Each Practical Paper :

Each Practical Paper		
Minimum Passing % Marks	Full Marks	Minimum Passing Marks
34%	50	17

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Session : 2019-20

Class/कक्षा : B.Sc./ बी.एस.सी. Semester/ सेमेस्टर : I/प्रथम

Subject/विषय : Physics / भौतिक शास्त्र

Title of Subject Group : Machanics, Oscillations and Properties of Matter

विषय समूह का शीर्षक : यांत्रिकी, दोलन एवं पदार्थ के गुण

Compulsory / अनिवार्य

Max. Marks अधिकतम अंक : 60

Min. Passing Marks : 21

Particulars/विवरण

Unit-I

Mathematical Background

Scalars and vectors quantities dot and cross products, triple vector product, gradient of scalar field and its geometrical Intrepretation, divergence and curl of a vector field, line, surface and volume integrals, flux of a vector field, Gauss's divergence theorem, Green's theorem and Stoke's theorem, Functions of two and three variables, partial derivatives geometrical interpretation of partial derivatives of functions of two variables. Total differential of a function of two and three variables, Repeated integrals of a function of more than one variable, definition of a double and triple integral.

Unit-II

Mechanics

Laws of motion, motion in a uniform field, components of velocity and acceleration in different coordinate systems (Cartesian, Cylindrical and Spherical). Uniformly rotating frame, centripetal acceleration,Coriolis force and its applications. Motion under a central force, Kepler's laws. Gravitational law and field, Gravitational potential & field intensity,

Potential due to a spherical body, System of Particles, centre of mass, equation of motion, conservation of linear and angular, momentum, conservation of energy.

Unit-III

Oscillations

Rigid body motion, rotational motion, moment of inertia and their theorem, principal moments and axes, Euler's equations, Potential well and periodic oscillations, case of harmonic oscillations, differential equation and its solution, kinetic and potential energy, simple harmonic oscillations and its examples, spring and mass system, simple and compound pendulum, torsional pendulum.

Unit-IV

Superposition of Harmonic Motion

Bifilar oscillations, Helmoholtz resonator, LC circuit, Vibrations of a magnet, oscillations of two masses connected by a spring. Principle of superposition of two simple harmonic motions of the same frequency, Lissajous figures, case of different frequencies, damped harmonic oscillators, power dissipation, quality factor and their examples, driven harmonic oscillator; transient and steady states, power absorption.

Unit-V

Properties of matter

Elasticity, small deformations, Hooke's Law, elastic constants for an isotropic solid and relation between them, beams supported at both the ends, contilever, torsion of a cylinder, bending moments and shearing forces. Kinematics of moving fluids, equations of continuity, Eulers equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow Poiseulle's law, capillary tube flow, Reynold's number, Stokes law, Surface tension and surface energy molecular interpretation of surface tension, pressure on a curved liquid surface, wetting.

AND REFERENCE BOOKS :-

E.M. purcell, Ed Berkely physics course, vol. Mechnics (Mc. Gr. Hill) R P Feynman, R.B. lighton and M. Sands the feynman lectures in physics, Vol I (B) publications, Bombay, Delhi, Calcutta, Madras.
D.P. Khandelwal, Oscillations and waves (Himalaya Publishing House Bombay)

R.K. Ghosh, The Mathematics of waves and vibrations (Macmillan 1975)
J.C. Upadhayaya – Mechanics (Hindi and English Edition)
D.S. Mathur – Machanics and properties of matter.
Brij lal and Subramanium – Oscillations and waves.
Resnick and Halliday – volume I

Session : 2019-20

Class/कक्षा : B.Sc./ बी.एस.सी. Semester/ सेमेस्टर : II/द्वितीय

Subject/विषय : Physics/भौतिक शास्त्र

Title of Subject Group : Electrostatics and Stead Currents

विषय समूह का शीर्षक : स्थैत विद्युत एवं स्थायी धारा

Compulsory / अनिवार्य

Max. Marks अधिकतम अंक : 60

Min. Passing Marks : 21

Particulars/विवरण

Unit-I

(Electrostatics)

Coulombs law in vacuum expressed in vector forms, calculations of E for simple distributions of charge at rest, dipole and quadrupole fields. Work done on a charge in an electrostatic fields expressed as a line Integral, conservative nature of the electrostatic field. Electric potential, torque on a dipole in a uniform electric field and its energy. Flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, Gaussian pillbox, fields at a surface of a conductor, screening of E field by a conductor Capacitors, electrostatic field energy, force per unit area of the surface of a conductor in an electric field, conducting sphere in a uniform electric field, point charge in front of a grounded infinite conductor.

Unit-II

(Dielectrics & Electric Currents)

Dielectrics, parallel plate capacitor with a dielectric. Dielectric constant, electric susceptibility electric permittivity, polarization and polarization vector, and displacement vector D, molecular interpretation of Claussius-Mossotti equation.

Steady current, current density J, non-steady currents and continuity equation, Kirchoff's laws and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constants, transients in LCR circuits, AC circuits, complex number and their applications in solving AC circuits problem, complex impedance and reactance, series and parallel resonance, circuit Q factor, power consumed by an A.C. circuit, power factor.

Unit-III

(Motion of Charged Particles in Electric and Magnetic Field's)

(Note : The emphasis here should be on the mechanical aspects and not on the details of the apparatus mentioned which are indicated as applications of principles involved)

E as an accelerating field, electron gun, case of discharge tube, linear accelerator. E as deflecting field, CRO, sensitivity of CRO. Transverse B field; 180^{o} deflection, mass spectrograph curvatures of tracks for energy determination for nuclear particles; principles of a cyclotron. Mutually perpendicular E and B fields, velocity selector, its resolution. Parallel E and B fields; positive ray parabolas, discovery of istotopes, elements of mass spectrograph principle of magnetic focusing (lenses).

Unit-IV

(Magnetostatics)

Force on a moving charge; Lorentz force equation and definition of B, force on a straight conductor carrying current in a uniform magnetic field, torque on a current loop, magnetic dipole moment, angular momentum and gyromagnetic ratio, Biod and Savart's Law, Calculation of H for simple geometrical situations Ampere's Law, Field due to a magnetic dipole, magnetization current magnetization vector.

Unit-V

(Time Varying Fields)

Electromagnetic induction, Faraday's Laws, electromotive force e=E.dl., Integral and differential forms of Faraday's laws. Self and mutual inductance, trasformers energy in a static magentic field. Maxwell's displacement current derivations of Maxwell's equations,

electromagnetic field energy density and Poynting's vector. The wave equation satisfied by B and B, plane electromagnetic waves in vacuum.

TEXT AND REFERENCE BOOKS :

1. Barkley Physics Course, Electricity and Magnetis, Ed. E.M. Purcell (Mc Graw- Hill)
2. Halliday and Resnik, Physics, Vot. 2.
3. D. J Grifith; Introduction to Electrodynamics (Prentice-Hall of India)
4. Raitz and Millord ; Electricity and Magnetism (Addison Wesley)
5. A S Mahajan and A A Rangwala; Electricity and Magnetism (Tata Mc. Graw hill)
6. A M Portis, Electromangnetic fields.
7. Pugh & Pugh, Principles of Electricity and Magnetism (Addison Westey)
8. Panofsky and Phillips, Classical Electricity and Magnetism, (India Book House)
9. S.S. Atwood, Electricity and Magnetism (Dover)

PRACTICAL

Minimum 16 (Eight from each group)

EXPERIMENTS OUT OF THE FOLLOWING OF SIMILAR EXPERIMENTS OF EQUAL STANDARD

GROUP-A

1. Study of theorems of parallel and perpendicular axes for moment of inertia.
2. Study of conservation of momentum in two dimensional oscillations
3. Study of a compound pendulum.
4. Study is damping of a bar pendulum under various mechanics.
5. Study of oscillations under a billar suspension.
6. Potential energy curves of a 1-Double sysem and oscillations in it for various ampl.
7. Study of oscillations of a mass under different combinations of springs.
8. Study of bending of a contilever or a beam.
9. Study of torsion of wire (static and oynamic methods)
10. Study of flow of liquids through capillaries.
11. Determination of surface tension of a liquid by different methods.
12. Study of viscosity of a fluid by different methods.

Group – B

1. Characterstics of a ballestic galvanomenter.
2. Setting up and using an electroscope or electrometer.
3. Use of a vibration magnetometer to study a field.
4. Study of B field due to a current.
5. Measurement of low resistance by Carey-Foster bridge or otherwise.
6. Measurement of inductance using impedance at different frequencies.
7. Study of decay of currents in LR and RC circuits.
8. Response curve for LCR circuit and resonance frequence and quality factor.
9. Sensitivity of a cathode-ray oscilloscope.
10. Characteristics of a choke.
11. Measurement of inductance.
12. Study of Lorentz force.

13. Study of discrete and continuous LC transmission lines.
14. Elementary Fortran programs, flowcharts and their interpretation.
15. To find the product of two matrices.
16. Numerical solution of equation of motion.
17. To find the roots of quadratic equation.

TEXT AND REFERENCE BOOKS :

1. B. Saraf et al Machanical Systems (Vikas Publishing House, New Delhi)
2. D.P. Khandelwal, A Laboratory Manual of Physics for Undergraduate classes (Van Publication House, New Delhi)
3. C.G. Lambe Elements of Statistics (Longmans Green and Co London New York, Toronto C Dixon, Numerical Analysis.
4. S Lipsdutz and a Poe, Schaum's Outline of theory and problems of programming with fortran (MC Graw- Hill Book Company, Singapore 1986)

Practical Marks Scheme :

Work	Marks distribution
Laboratory note book/project	10
Viva voce	10
Experiments (1)	30 (each 15 marks)
Total	50

Govt. Bilasa Girl's P.G. (Auto.) College

Bilaspur

SYLLABUS

B.Sc. Physics

Semester – III & IV

2019-20

Govt. Bilasa Girls' P.G.(Auto.) College,

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Phone No. 07752-224249, Website : www.bilasagirlscollege.ac.in

Session : 2019-20
B.Sc. Semester III (July 2019)
PHYSICS M.M. : 60

THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS

Unit – I : The laws of thermodynamics – The zeroth law, concept of path function and point function various indicator diagrams, wore done by and on the system, first law of thermodynamics, internal energy as a state function, Reversible and irreversible change, Carnot theorem and the second law of thermodynamics different versions of the second law. Claussius theorem inequality. Entorpy, change of entropy in simple cases. (i) Isothermal expansion of an ideal gas, (ii) Reversible isochoric process, (iii) Free Adiabatic expansion of an ideal gas, Entropy of the universe. Principle of increase of entropy, The thermodynamics scale of temperature, its identity with the perfect gas scale, Impossibility of attaining the absolute zero, third law of thermodynamics.

Unit – II : Thermodynamic relationship : Thermodynamics variables. Extensive and intensive. Maxwell's general relationship, application to Joule Thomson cooling and adiabatic cooling in a general system. Vander Waals gas, Clausius – Clapeyron heat equation. Thermodynamic potential and equilibirum of thermodynamical system relation with thermodynamical variables. Cooling due to adiabatic demagnetization, production and measurement of very low tempeatures.
Black body radiation: Pure temprature dependence, Stefan-Boltzman law, pressure of radiation. Spetial distribution of BB radiation. Weins displacement law, Rayleigh-Jean's law, the ultraviolet catastrophy, Planck's quantum postualates. Planck's law, complete fit with experiment.

Unit-III : Maxwellian distribution of speeds in an idean gas : Distribution of speed and of velocities, experimental verification, distinction between mean, rms and most probable speed vaule. Doppler broadening of spectral lines.
Transport phenomena in gases : Molecular collisions, collision cross section, estimate of molecular diameter and Mean free path Transport of mass, mementum and energy and interrelationship, dependence on temperature and pressure.
Liquification of gases : Boyle temperature and inversion temperature. Principle of regenerative colling of cascade colling, liquefaction of hydrogen and helium. Refrigeration cycles and meaning of efficiency.

Unit-IV : The statistical basic of thermogynamics : Probability and thermodynamic probability, principle of equal a priori probabilities, statically postulates. Concept of Gibbs's ensemble. Accessible and inaccessible states. Concept of phase space, canonical phase space. Gamma phase space and mud phase space. Equillibrium before two systems in thermal contact, Probability and entropy. Boltzman entropy relation. Boltzman Canonical distribution law and its applications. Law of equitation on energy. Transition to quantum statistics. 'H' as a natural constant and its implication, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

Unit – V : Indistinguishability of particles and its consequences. Bose – Einstein's and Fermi – Dirac conditions, concept of partition function, Derivation of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac, Statistics through Canonical partition function. Limit of B-E and F-D statistics to M-B statistics, Application of B-E statistics to black body radiation. Application of F-D statistics to free electron in a metal.

TEXT AND REFERENCE BOOKS :

1. B.B. Laud "Introduction to statistical mechanics" (Macmillan 1981)
2. F. Reif : "Statistical Physics" (Mcgraw Hill,1988)

3. K. Haung : "Statistical Physics" (Wiley Eastern 1988)
4. Thermal and Statistical Physics : nR.K. Singh Y.M. Gupta and S. Sivaraman
5. Physics (Part-2) : Editor, Prof. : B.P. Chandra, M.P. Hindi Granth Academy.

Session : 2019-20

B.Sc. Semester IV (January 2020)

PHYSICS

M.M. : 60

WAVES, ACOUSTICS AND OPTICS

UNIT – I : Waves in media : Speed of transverse waves on a uniform string, speed of longitudianal waves in a fluid, energy density and energy transmission in waves, typical measurements. Waves over liquid surface : gravity waves and ripples. Group velocity and phase velocity, their measurements.
Harmonics and the quality of sound, examples. Production and detection of ultrasonic and infrasonic waves and applications.
Reflection, refrection and diffraction of sound : Acoustic impedence of a medium, percentage reflection and refraction at a boundary, impedence matching for transducers, diffraction of sound, principal of a sonar system, sound ranging.

UNIT-II :- Fermat's principle of extremum path, the aplantic points of a sphere and other applications.
Cardinal points of an optical system, thick lens combinations, lagrange equation of magnification, telescopic combinations, telephoto lenses.
Monochormatic aberrations and their reduction, spherical mirrors and Schmidt corrector plates, aplantic points, oil immersion objectives, meniscus lens.
Optical instruments : Entrance and exit pupils, need for a multiple lens eyepiece. Common types of eye pieces. (Ramsden's and Hygen's eye pieces. (Ramsden's and Hygen's eyepieces).

UNIT-III : Interference of Light : The principle of superposition. Two slit interference. Coherence requirement for the sources, optical path retardations, lateral shift of frings, Rayleigh refractometer. Localized fringes, thin films.
Haidinger fringes : Fringes of equal inclination. Michelson interferometer, its application for precision determination of wavelength. Wavelength difference and the width of spectral lines. Intensity distribution in multiple beam interference. Tolansky fringes, Fabry-Perot interferometer and etalon.

UNIT – IV : Fresnel diffraction : Fresnel's half-period zones, zone plates, straight edge, rectilinear propagation.
Fraunhofer diffraction : Diffraction at a slit, half period zones, phasor diagram and integral calculus methods, the intensity distribution, diffraction at a circular aperture and a circular disc, resolution of images, Rayleigh criterion, resolving power of telescope and microscope systems.
Diffraction gratings : Diffraction at N parallel slits, intensity distribution, plane diffraction grating, reflection grating and blazed gratings. Concave grating and different mountings resolving power of a grating and comparison with resloving power of prism and of a Fabry-Perot etalon and comparision with resolving power of prism and of a Fabry-Perot etalon.
Double refraction and optical rotation : Reflection in unizxial crystals, phase retardation plates, double image prism. Rotation of plane of polarization. Origin of optical rotation in liquids and in crystals.

UNIT-V : Laser System : Purity of a spectral line. Coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emmissions, condition for Laser action, populatoin inversion. Types of Laser : Ruby and He-Ne lasers and semiconductor lasers.

Application of lasers : Application in communication, Holography and non linear optics. (Polarization P including higher order terms in E and generation of harmonics).

TEXT AND REFERENCE BOOKS :

1. A.K. Ghatak, Physical Optics.
2. D.P. Khandelwal Optics and Atomic Physics (Himalaya Publishing House, Bombay, 1988)
3. F. Smith and J.H. Thomson : Manchester Physics series : Optics (English language book society ant john wiley, 1971)
4. Born and Wolf : Optics.
5. K.D. Moltev : Optics (Oxford University Press)
6. Sears; Optics.
7. Jenkins and White : Fundamental of Optics (Mc Graw Hill)
8. B.B. Laud : Lasers and Non Linear optics (Wiley Eastern 1985)
9. Smith and Thomson : Optics (John Wiley and sons)
10. Berkely Physics course : VI, III Waves and Oscillations.
11. I.G. Main, Vibrations and Waves (Cambridge University Press)
12. H.J. Pain 'The Physics of Vibration and Waves (Macmillan 1975)
13. Text book of optics : B.K. Mathur
14. B.Sc. (Part III) Physics : Editor : B.P. Chandra, MP Hindi Granth Academy.

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Session : 2019-20
B.Sc. Semester III

PHYSICS PRACTICALS

NOTE : Practical classes will be held round the year but practical examination shall be conducted only in IV semester. Duration of Practical Examinations shall be of 4 hours.

1. Study of Brownian motion.
2. Study of converstion of mechanical energy into heat.
3. Study of adiabatic expansion of a gas.
4. Heating efficiency of electrical kettle with varying voltages.
5. Resistance Thermometry.
6. Thermo emf thermometry.
7. Conduction of heat through poor conductors of different geometries.
8. Experimental study of probability distribution for a two option system using a colored dice.
9. Speed of waves on a streches string.
10. Studies on torsonial waves in a lumped system.
11. Studies of interference with tow concurrent sources of sound.
12. Chaladi's figures with varying excitation and loading points.
13. Measurement of sound intensities with different situation.
14. Characteristics of a microphone loudspeaker system.

Session : 2017-18
B.Sc. Semester IV

PHYSICS PRACTICALS

1. Study of monochromatic defects of images.
2. Determining the principle points of a combination of lenses.
3. Study of interference of light (biprism or wedge film).
4. Study of diffraction at a straight edge or a single slit.
5. Study of F-P etalon frings.
6. Use of diffraction grating and resloving limit.
7. Resolving limit of a telescope system.
8. Polarization of light by reflection : also cos-squred law.
9. Study of optical rotation for any system.
10. Study of laser as a monochromatic coherent source.
11. Study of divergence of a laser beam.

Practical Marks Scheme :

Work	Marks distribution
Laboratory note book/project	10
Viva voce	10
Experiments (2)	30 (each 15 marks)
Total	50

TEXT AND REFERENCE BOOKS :

D.P. Khandelwal : Optics and Atomic Physics (Himalaya Publishing House, Bombay, 1988)
D.P. Khandelwal : A Laboratory Manual for Undergraduate Classes (Vanui Publication, House, New Delhi.

S.Lipschutz and A Poe " Schaum's Outline of theory and problems of Programming with Fortran "(Mc Graw – Hill Book Comany, 1986)

Govt. Bilasa Girl's P.G. (Auto.) College

Bilaspur

SYLLABUS

B.Sc. Physics

Semester – V & VI

2019-20

Govt. Bilasa Girls' P.G.(Auto.) College,

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B.Sc. Semester V (Physics)

RELATIVITY, QUANTUM MECHNICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS

UNIT-I Reference systems, inertial frames, Galilean invariance and conservation laws, propogation of light, Michelson Morley experiment, search for ether.

Poltulates 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 uncertainly principle : de Broglie's hypothesis for matter waves : the concept of wave and group velocities, evidence for diffraction & interference of particles, experimental demonstration on mater waves Davission and Germer's experiment.

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

Consequence of the uncertainly 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 oscillator in one dimension, reflection at a step potential, transmission across a potential barrier.

Hydrogen atom : natural occurence of n, c 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 specta for s, p, d and f states, selection rules.

Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of internuclear distance, pure rotatinal and rolation vibration spectra. Dissociation limit for the ground and other electronic states, transition rules for pure vibration and electronic vibration spectra.

Raman Effect, Stokes and anti-Stokes lines, complimentary character of Ramn and infrared spectra, experimental arrangements for Raman spectroscopy.

UNIT-V Interaction of charged partilces and neutrons with mater, working of nuclear detectos, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions.

Structure of nuclear, basic properties (__ ___ Q and binding energy), deuteron binding engery, 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 reaction, channels, compound nucleus, direct reaction (concepts), Shell model & liquid drop model, fission and fusion (concepts), energy production in stars by p-p and carbon cycles (concepts).

TEXT AND REFERENCE BOOKS :

1. H.S. Mani and G.K. Metha, "Introduction to Modern Physics" (Affiliated East-West Press, 1989)
2. A Beiser, "Prospective of Modern Physics.
3. H.E. White Introduction to Atomic Physics.
4. Barrow, "Introduction to Molecular Physics.
5. R.P. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol. III (B.I. Publications, Bombay, Delhi, Calcutta, Madras)
6. T.L. Littlefield and N Thorley, "Atomic and Nuclear Physics", (Engineering Language Book Society)
7. H.A. Enge, "Introduction to Nuclear Physics", (Addision-Wesly)

8. Eisenberg and Resnik, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)

B.Sc. Semester VI (Physics)

SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

UNIT-I Amorphous and crystalline solids, Elements of symmerty, seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-Ray diffraction, Bragg's Law. Bonding in solids, classification, Cohesive energy of solid.

Specific heat of solids, classical theory (Dulong-Petits law). Einstein and Debye theories. Vibrational model of one dimensional monoatomic lattice, dispersion relation, Brilliouin Zone.

UNIT-II Free electron model of a metal, Solution of one dimensional Schrodiner equation in a constant potential. Density of states. Fermi Energy, Energy bands in a solid (Kroning-Penny model without mathematical details), Metals, Insulator and Semiconductors. Hall effect.

Dia, Para and Ferromagnetism, Langevin's theory of dia and para-magnetism. Curie Weiss's Law. Qualilative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.

UNIT-III Intrinsic semiconductors, carrier concentration in thermal equilibrium, Fermy level, Impurity semiconductor, doner and acceptor levels, Diode equation, junctions, junction breakdown, Depletion width and junction capacitance abrupt junction, Tunnel diode, Zener diode. Light emmitting diode, solar cell, Bipolar transistors, php and npn transistors, characteristics of transistors, different contigurations, curreng amplification factor, FET.

UNIT-IV Hall and full wave rectifier, rectifier efficiency ripple factor, Bridge rectifier, Filters, Inductor filter, T and N filters, Zener diode, regulated power supply.

Applications of transistors.

Bipolar Transistor as amplifier,

Single stage and CE small signal amplifiers, Emitter followers, Transistoras power amplifier, Transistor as oscillator, Wein-Bridge Oscillator and Hartely oscillator.

UNIT-V Indtorduction to computer organisation, time sharing and multi programming systems, window based word processing packages, MS-Word.

Introduction to C programming and application to simple problems of arranging numbers in ascending/descending orders sorting a given data in an array, solution of simultaneous euation.

BOOKS RECOMMENDED:

1. Introduction to solid state physics : C Kittel
2. Solid State Physics : A.J. Dekkar
3. Electronic Circuits : Mottershead
4. Electronic Cirucuits : Millman and Halkias.
5. Semiconductor Devices : S.M. Sze
6. Computer fundamental : balagupta Swami.

PRACTICALS

MINIMUM 16 (Sixteen) Out of the following or similar experiment of equal standard.

1. Determination of Planck's constant
2. Determinations of e/m by using Thomson's tube
3. Determinations of e by Millikan's method.
4. Study of spectra of hydrogen and deuterium (Rydberg constant and ratio of masses of electron proton.
5. Absorption spectrum of iodine vapour.
6. Study of alkali or alkaine earth spectra using a concave gra's
7. Study of Zeeman effect for determination of Lande g-factor.
8. Analysis of a given band spectrum.
9. Study of Raman spectrum using laser as an excitation source.
10. Study of absorption of alpha and beta rays.
11. Study of statistics in radioactive measurement.
12. Coniometric study of crystal faces.
13. Determination of dielectric constant.
14. Hysteresis curves of transformer core.
15. Hall-probe method for measurement of magentic field.
16. Specific resistance and energy gap of a semiconductor.
17. Characteristics of transistor.
18. Characteristics of a tunnel diode.
19. Study of voltage regulation system.
20. Study of a regulated power supply.
21. Study of lissajous figures using a CRO.
22. Study of VTVM.
23. Study of RC and TC coupled amplifiers.
24. Study of AF and RF oscillators.
25. Find roots of f(x)=0 by using Newton Raphson method.
26. Find roots of f(x)=0 by using secant method.
27. Integration by simpson rule.
28. To find the value of V at
29. String manipulations.
30. Towers of Honoi (Nonrecursive)
31. Finding first four perfect numbers.
32. Quadratic interpolation using Newton's forward difference formula of degree two.

TEXT AND REFERENCE BOOKS :

1. B.G. Strechman : "Solid State Electronic Devices". II Edition (Prentice – Hall of India, New Delhi, 1986)
2. W.D. Stanley, "Elecronic Devices, Circuits and Application" (Prentice Hall, New Jersey, USA, 1988)
3. S. Lipschutsz and A Poe; "Schaum's Outline of Theory and Problems of Programming.