DEPARTMENT OF PHYSICS

COURSE CURRICULUM & MARKING SCHEME

B.Sc. PART – I, II, III
PHYSICS

SESSION : 2021-22

ESTD: 1958

GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A$^+$, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

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DEPARTMENT OF PHYSICS

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG

Approved syllabus for B.Sc. PHYSICS by the members of Board of Studies for

The Session 2021-22 the syllabus with the paper combinations is as under

B.Sc. I:

Paper I: MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER	Paper II: ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY
PHYSICS PRACTICALS LAB	

B.Sc. II:

Paper I: THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS	Paper II: WAVES, ACOUSTICS AND OPTICS
PHYSICS PRACTICALS LAB	

B.Sc. III:

Paper I: RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS	Paper II: SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS
PHYSICS PRACTICALS LAB	

The syllabus for B.Sc. PHYSICS is hereby approved for the session 2021-22

Name and Signatures

	Departmental members
V.C. Nominee	1. H.O.D/Dr. Purna Bose............................
Subject Expert	2. Dr. Jagjeet Kaur Saluja............................
Subject Expert...	3. Dr.R.S. Singh............................
Alumni (member)...	4. Dr. Anita Shukla............................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar............................
Specialist from Industry............................	6. Dr. Abhishek Kumar Misra............................

Syllabus and Marking Scheme for B.Sc. First Year

Session 2021-22

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I	MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER	50	17
II	ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY	50	17
III	Lab course/ Practical	50	17
	Total	150	

02 Theory papers   -   100

01 Practical   -   50

Total Marks   -   150

Name and Signatures

V.C. Nominee	Departmental members
Subject Expert	1. H.O.D/Dr. Purna Bose...............
Subject Expert...................................	2. Dr. Jagjeet Kaur Saluja...............
Alumni (member)...................................	3. Dr.R.S. Singh...............
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	6. Dr. Abhishek Kumar Misra...............

GOVT. V. Y. T. AUTO. COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021-22)
B.Sc. - I (PHYSICS)
PAPER-I
MECHANICS, OSCILLATIONS AND PROPERTIES OF MATTER

UNIT-1

Cartesian, Cylindrical and Spherical coordinate system, Inertial and non-inertial frames of reference, uniformly rotating frame, Coriolis force and its applications. Motion under a central force, Kepler's laws. Effect of Centrifugal and Coriolis forces due to earth's rotation, Center of mass (C.M.), Lab and C.M. frame of reference, motion of C.M. of system of particles subject to external forces, elastic, and inelastic collisions in one and two dimensions, Scattering angle in the laboratory frame of reference, Conservation of linear and angular momentum, Conservation of energy.

UNIT-2

Rigid body motion, rotational motion, moments of inertia and their products, principal moments & axes, introductory idea of Euler's equations. Potential well and Periodic Oscillations, case of harmonic small oscillations, differential equation and its solution, kinetic and potential energy, examples of simple harmonic oscillations: spring and mass system, simple and compound pendulum, torsional pendulum.

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UNIT-3

Bifilar oscillations, Helmholtz resonator, LC circuit, vibrations of a magnet, oscillations of two masses connected by a spring. Superposition of two simple harmonic motions of the same frequency, Lissajous figures, damped harmonic oscillator, case of different frequencies. Power dissipation, quality factor, examples, driven (forced) harmonic oscillator, transient and steady states, power absorption, resonance.

UNIT-4

E as an accelerating field, electron gun, case of discharge tube, linear accelerator, E as deflecting field- CRO sensitivity, Transverse B field, 180o deflection, mass spectrograph, curvatures of tracks for energy determination, principle of a cyclotron. Mutually perpendicular E and B fields: velocity selector, its resolution. Parallel E and B fields, positive ray parabolas, discovery of isotopes, elements of mass spectrography, principle of magnetic focusing lens.

UNIT-5

Elasticity: Strain and stress, elastic limit, Hooke's law, Modulus of rigidity, Poisson's ratio, Bulk modulus, relation connecting different elastic- constants, twisting couple of a cylinder (solid and hallow), Bending moment, Cantilever, Young modulus by bending of beam.
Viscosity: Poiseulle's equation of liquid flow through a narrow tube, equations of continuity. Euler's equation, Bernoulli's theorem, viscous fluids, streamline and turbulent flow. Poiseulle's law, Coefficient of viscosity, Stoke's law, Surface tension and molecular interpretation of surface tension, Surface energy, Angle of contact, wetting.

Name and Signatures

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose.......................
Subject Expert	2. Dr. Jagjeet Kaur Saluja....................
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Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar..............
Specialist from Industry........................	6. Dr. Abhishek Kumar Misra..............

TEXT AND REFERENCE BOOKS:

1. E M Purcell, Ed Berkely physics course, vol. Mechanics (Mc. Gr. Hill) R P Feynman.
2. R B Lighton and M Sands, the Feynman lectures in physics, vol 1 (B) publications, Bombay, Delhi, Calcutta, Madras.
3. D P Khandelwal, Oscillations and waves (Himalaya Publishing House Bombay).
4. R. K. Ghosh, The Mathematics of waves and vibrations (Macmillan 1975).
5. J.C. Upadhyaya- Mechanics (Hindi and English Edition.).
6. D.S. Mathur- Mechanics and properties of matter.
7. Brijlal and Subramanium- Oscillations and waves. Resnick and Halliday- Volume I.
8. Physics Part –1: Resnick and Halliday.

Name and Signatures

V.C. Nominee	Departmental members
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Course Outcomes:

1. This course gives abroad knowledge aboutthe basic laws of mechanics. Also it deals with the basic forces like centripetal, centrifugal forces, Coriolis forces and their applications.
2. It also gives the knowledge about the conservative Forces and non-conservative forces and central forces. Kepler's Laws, Gravitational Law and potential is also described in this course. Laws of conservation of linear momentum, angular momentum and energy. Rotatory Motion, Laws of inertia, products of Inertia, Euler's Equation.
3. Knowledge of simple harmonic oscillator and derivation of the differential equations of S.H.O. and examples were discussed. Damped and forced oscillations were also discussed.
4. Motion of charged particles in electric and magnetic field were also discussed. Some instruments like linear oscillator, cyclotron magnetic selector is discussed. In case of properties like elasticity stress and strain, Hooke's law, Young's modulus, modulus of rigidity, elastic constants and relation between different elastic constants were calculated.
5. In case of kinematics of Moving Fluids – equation of continuity, stream line flow, Euler's equation of motion, capillary action, Stoke's law, Poiseuiie's formula were taught. In case of surface tension- cohesive and adhesive forces, capillarity, Jaeger's method, Quinke's method were discussed.

('In case, any change or modification is prescribed by Central Board of studies or Higher Education Deptt. Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.')

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Specialist from Industry..........................	6. Dr. Abhishek Kumar Misra..........

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.

2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)

3. Section B shall contain short answer type questions with the limit of 150 words.

4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.

5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
A (Very short Answer)	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
C (Long Answer)	3x5 = 15	3x5 = 15	5x5 = 25	8x5 = 40

Name and Signatures

V.C. Nominee ....

Subject Expert ....

Subject Expert....................

Alumni (member)....................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry....................

Departmental members

1. H.O.D/Dr. Purna Bose....................

2. Dr. Jagjeet Kaur Saluja....................

3. Dr. R.S. Singh....................

4. Dr. Anita Shukla....................

5. Mrs. Siteshwari Chandrakar....................

6. Dr. Abhishek Kumar Misra....................

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

Name and Signatures

V.C. Nominee	**Departmental members** 1. H.O.D/Dr. Purna Bose......................
Subject Expert	2. Dr. Jagjeet Kaur Saluja...................
Subject Expert..	3 Dr. R.S.Singh...............................
Alumni (member)..	4. Dr. Anita Shukla..........................
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स्नातक कक्षाओं के लिए प्र न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्र न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।
2. खण्ड अ में अतिलघूत्तरी प्र न (एक या दो वाक्यों में उत्तर) या वस्तुनिश्ठ प्र न होंगे। (बहुविकल्पीय प्र न नहीं होंगे। 'रिक्त रथानों की पूर्ति करों ' जैसे प्र न भी नहीं होंगे।)
3. खण्ड ब में लघूत्तरी प्र न होंगे जिनका उत्तर 150 भाब्दों में देना होगा।
4. खण्ड स में दीर्घ उत्तरी / निवंधात्मक प्र न होंगे। विद्यार्थियों को अधिकतम 350 भाब्दों में सटीक उत्तर लिखना होगा।
5. प्र नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्र न का प्रकार	पूर्णाक 33 (अंक x प्र नों की संख्या)	पूर्णाक 34 (अंक x प्र नों की संख्या)	पूर्णाक 50 (अंक x प्र नों की संख्या)	पूर्णाक 75 (अंक x प्र नों की संख्या)
अतिलघूत्तरी प्र न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्र न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्र न	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्र नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्र नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

Name and Signatures

V.C. Nominee ....

Subject Expert ....

Subject Expert................................

Alumni (member)...............................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry...........................

Departmental members
1. H.O.D/Dr. Purna Bose........................

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GOVT. V. Y. T. AUTO. COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021-22)
B.Sc. - I (Physics)
PAPER-II
ELECTRICITY, MAGNETISM AND ELECTROMAGNETIC THEORY

Note:- Numerical problems based on the topics must be asked in each unit.

UNIT-1

Repeated integrals of a function of more than one variable, definition of a double and triple integral. Gradient of a scalar field and its geometrical interpretation, divergence and curl of a vector field, and their geometrical interpretation, line, surface and volume integrals, flux of a vector field. Gauss's divergence theorem, Green's theorem and Stoke's theorem and their physical significance. Kirchoff's law, ideal Constant-voltage and Constant-current Sources. Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem and Maximum Power Transfer theorem.

UNIT-2

Coulomb's law in vacuum expressed in Vector forms, calculations of E for simple distributions of charges at rest, dipole and quadrupole fields. Work done on a charge in a electrostatic field expressed as a line integral, conservative nature of the electrostatic field. Relation between Electric potential and Electric field, torque on a dipole in a uniform electric field and its energy, flux of the electric field.

Gauss's law and its application: E due to (1) an Infinite Line of Charge, (2) a Charged Cylindrical Conductor, (3) an Infinite Sheet of Charge and Two Parallel Charged Sheets, 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.

Name and Signatures

	Departmental members
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Subject Expert	2. Dr. Jagjeet Kaur Saluja.......................
Subject Expert...................................	3 Dr.R.S.Singh............................
Alumni (member)...................................	4. Dr. Anita Shukla............................
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UNIT-3

Dielectric constant, Polar and Non Polar dielectrics, Dielectrics and Gauss's Law, Dielectric Polarization, Electric Polarization vector P, Electric displacement vector D. Relation between three electric vectors, Dielectric susceptibility and permittivity, Polarizability and mechanism of Polarization, Lorentz local field, Clausius Mossotti equation, Debye equation,

Ferroelectric and Paraelectric dielectrics, Steady current, current density J, non-steady currents and continuity equation, rise and decay of current in LR, CR and LCR circuits, decay constants, AC circuits, complex numbers and their applications in solving AC circuit problems, complex impedance and reactance, series and parallel resonance, Q factor, power consumed by an a AC circuit, power factor.

UNIT-4

Magnetization Current and magnetization vector M, three magnetic vectors and their relationship, Magnetic permeability and susceptibility, Diamagnetic, paramagnetic and ferromagnetic substances. B. H. Curve, cycle of magnetization and hysteresis, Hysteresis loss.

Biot-Savart's Law and its applications: B due to (1) a Straight Current Carrying Conductor and (2) Current Loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital law (Integral and Differential Forms).

UNIT-5

Electromagnetic induction, Faraday's law, electromotive force, integral and differential forms of Faraday's law Mutual and self inductance, Transformers, energy in a static magnetic field. Maxwell's displacement current, Maxwell's equations, electromagnetic field energy density. The wave equation satisfied by E and B, plane electromagnetic waves in vacuum, Poynting's vector.

	Departmental members
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TEXT AND REFERENCE BOOKS:

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

Course Outcomes:

1. Function of two and three variable, partial derivatives, geometrical interpretation of partial derivatives of a function of two variables. Scalars and vectors, dot and cross product, gradient of a scalar field, flux of a vector field, Gauss's divergence theorem.

2. Green's theorem and Stokes theorem. Coulombs law in vacuum expressed in vector forms, calculation of E for simple distributions of charged at rest dipole and quadrupole fields Electric potential ϕ, $E = -\Delta\ \phi$ torque on a dipole in a uniform electric field and its energy.

3. Flux of the electric field, Gauss's law and its application for finding E for symmetric charge distributions, fields at the 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.

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4. Dielectrics parallel plate capacitor with a dielectric, electric susceptibility, permittivity and dielectric constant, polarization and polarization vector, displacement vector D, Steady current, current density J, non steady currents and continuity equation, Kirchoff's law and analysis of multiloop circuits, rise and decay of current in LR and CR circuits, decay constant, transients in LCR circuits, network theorems.

5. 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, Biot and Savart's law, Ampere's Law, field due to a magnetic dipole, magnetic permeability.

6. Electromagnetic induction, Faraday's law, electromotive force, , transformers, energy in a static magnetic field. Maxwell's equations, electromagnetic field energy density. Pointing vector.

V.C. Nominee	**Departmental members**
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GOVY. V. Y. T. AUTO. COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021–2022)
B.Sc-1 (PHYSICS)

LIST OF EXPERIMENTS

Minimum 16 (Eight from each group)
Experiments out of the following or similar experiments of equal standard
GROUP-A

1. Study of laws of parallel and perpendicular axes for moment of inertia.
2. Moment of inertia of Fly wheel.
3. Moment of inertia of irregular bodies by inertia table.
4. Study of conservation of momentum in two dimensional oscillations.
5. Study of a compound pendulum.
6. Study of damping of a bar pendulum under various mechanics.
7. Study of oscillations under a bifilar suspension.
8. Study of modulus of rigidity by Maxwell's needle.
9. Determination of Y, k, η by Searl's apparatus.
10. To study the oscillation of a rubber band and hence to draw a potential energy curve from it.
11. Study of oscillation of a mass under different combinations of springs.
12. Study of torsion of wire (static and dynamic method).
13. Poisson's ratio of rubber tube.
14. Study of bending of a cantilever or a beam.
15. Study of flow of liquids through capillaries.
16. Determination of surface tension of a liquid.
17. Study of viscosity of a fluid by different methods

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GROUP-B

1. Use of a vibration magnetometer to study a field.
2. Study of magnetic field B due to a current.
3. Measurement of low resistance by Carey-Foster bridge.
4. Measurement of inductance using impedance at different frequencies.
5. Study of decay of currents in LR and RC circuits.
6. Response curve for LCR circuit and response frequency and quality factor.
7. Study of waveforms using cathode-ray oscilloscope.
8. Characteristics of a choke and Measurement of inductance.
9. Study of Lorentz force.
10. Study of discrete and continuous LC transmission line.
11. Elementary FORTRAN programs, Flowcharts and their interpretation.
12. To find the product of two matrices.
13. Numerical solution of equation of motion.
14. To find the roots of quadratic equation.
15. To find the product of two matrices.
16. Numerical solution of equation of motion.
17. To find the roots of quadratic equation.

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TEXT AND REFERENCE BOOKS:
1. B saraf et al Mechanical Systems(Vikas publishing House,New Delhi).
2. D.P. khandelwal, A Laboratory Manual of Physics for Undergraduate classes (Vani Publication House,New Delhi).
3. C G Lambe Elements of statistics (Longmans Green and Co London New York, Tprpnto).
4. C Dixon, Numerical analysis.
5. S Lipsdutz and A Poe, schaum's outline of theory and problems of programming with Fortran (MC Graw-Hill Book Company, Singapore 1986).

Course Outcome:

Practicals based on simple mechanics and oscillations and electricity which are used in our daily life are taught.

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Departmental members
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Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
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C (Long Answer)	3x5 = 15	3x5 = 15	5x5 = 25	8x5 = 40

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

V.C. Nominee ....

Subject Expert ....

Subject Expert................................

Alumni (member)................................

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Departmental members
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17

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।

2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिष्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करों ' जैसे प्रश्न भी नहीं होंगे।)

3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 शब्दों में देना होगा।

4. खण्ड स में दीर्घ उत्तरी/निबंधात्मक प्रश्न होंगे। विद्यार्थियों को अधिकतम 350 शब्दों में सटीक उत्तर लिखना होगा।

5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्रश्न का प्रकार	पूर्णांक 33 (अंक x प्रश्नों की संख्या)	पूर्णांक 34 (अंक x प्रश्नों की संख्या)	पूर्णांक 50 (अंक x प्रश्नों की संख्या)	पूर्णांक 75 (अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्रश्न	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

V.C. Nominee	Departmental members
	1. H.O.D/Dr. Purna Bose...........................
Subject Expert	2. Dr. Jagjeet Kaur Saluja......................
Subject Expert...............................	3 Dr.R.S.Singh...........................
Alumni (member)...............................	4. Dr. Anita Shukla...........................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar...........
Specialist from Industry...........................	6. Dr. Abhishek Kumar Misra...........

Syllabus and Marking Scheme for B.Sc. SECOND YEAR

Session (2021–2022)

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I	Thermodynamics, kinetic Theory and Statistical physics	50	17
II	Waves, Acoustics and optics	50	17
III	Lab course/ Practical	50	17
	Total	150	

02 Theory papers   -   100

01 Practical   -   50

Total Marks   -   150

Name and Signatures

V.C. Nominee ....

Subject Expert ....

Subject Expert...................................

Alumni (member)...................................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry...................................

Departmental members
1. H.O.D/Dr. Purna Bose...................

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4. Dr. Anita Shukla...................

5. Mrs. Siteshwari Chandrakar...................

6. Dr. Abhishek Kumar Misra...................

GOVT. V. Y. T. AUTO. PG COLLEGE, DURG (C.G)

SYLLABUS FOR: (2021–2022)

B.Sc. Part-II

Paper-I

THERMODYNAMICS, KINETIC THEORY AND STATISTICAL PHYSICS

UNIT-1

The laws of thermodynamics: The Zeroth law, first law of thermodynamics, internal energy as a state function, reversible and irreversible change, Carnot's cycle, carnot theorem, second law of thermodynamics. Claussius theorem inequality. Entropy, 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. Concept of entropy, Entropy of the universe. Entropy change in reversible and irreversible processes, Entropy of Ideal gas, Entropy as a thermodynamic variable, S-T diagram, Principle of increase of entropy. The thermodynamic scale of temperature. Third law of thermodynamics, Concept of negative temperature.

UNIT-2

Thermodynamic functions, Internal energy, Enthalpy, Helmholtz function and Gibb's free energy, Maxwell's thermodynamical equations and their applications, TdS equations, Energy and heat capacity equations Application of Maxwell's equation in Joule Thomson cooling, adiabatic cooling of a system, Van der Waals gas, Clausius-Clapeyron heat equation. Blackbody spectrum, Stefan-Boltzmann law, Wien's displacement law. Rayleigh-Jean's law, Planck's quantum theory of radiation.

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose.............
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Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar..........
Specialist from Industry................	6. Dr. Abhishek Kumar Misra..........

UNIT-3

Maxwellian distribution of speeds in an ideal gas: Distribution of speeds and velocities, experimental verification, distinction between mean, rms and most probable speed values. Doppler broadening of spectral lines. Transport phenomena in gases: Molecular collisions mean free path and collision cross sections. Estimates of molecular diameter and mean free path. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.

Behaviour of Real Gases: Deviations from the Ideal Gas Equation. The Virial Equation. Andrew's Experiments on CO_2 Gas. Critical Constants.

UNIT-4

The statistical basis of thermodynamics: Probability and thermodynamic probability, principle of equal a priori probabilities, statistical postulates. Concept of Gibb's ensemble, accessible and inaccessible states. Concept of phase space, γ phase space and μ phase space. Equilibrium before two systems in thermal contact, probability and entropy, Boltzmann entropy relation. Boltzmann canonical distribution law and its applications, law of equipartition of energy. Transition to quantum statistics: ' h' as a natural constant and its implications, cases of particle in a one-dimensional box and one-dimensional harmonic oscillator.

UNIT-5

Indistinguishability of particles and its consequences, Bose-Einstein & Fermi-Dirac conditions, Concept of partition function, Derivation of Maxwell-Boltzmann, Bose Einstein and Fermi-Dirac Statistics, Limits 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 electrons in a metal.

	Departmental members
V.C. Nominee	1. H.O.D/Dr. Purna Bose.................
Subject Expert	2. Dr. Jagjeet Kaur Saluja.............
Subject Expert............................	3 Dr.R.S.Singh..........................
Alumni (member)........................	4. Dr. Anita Shukla......................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar..........
Specialist from Industry................	6. Dr. Abhishek Kumar Misra...........

TEXT AND REFERENCE BOOKS:

1. B.B. Laud, " Introduction to Statistical Mechanics" (Mcmillan 1981)

2. F. Reif: " Statistical Physics" (Mcgraw-Hill, 1998).

3. K, Haung: " Statatistical Physics" (Wiley Eastern, 1988).

4. Thermal and statistical Physics: R.K. Singh, Y.M. Gupta and S. Sivraman.

5. Statistical Physics: Berkeley Physics Course, Vol. 5

6. Physics (Part-2): Editor, Prof. B.P. Chandra, M.P. Hindi Granth Academy.

7. Heat and Thermodynamics: K.W. Zeemansky.

8. Thermal Physics: B.K. Agarwal.

9. Heat and Thermodynamics: BrijLal and N. Subramanyam.

10. Heat and Thermodynamics: Dayal, Verma and Pandey.

11. A Treatise on Heat: M.N. Saha and B.N. Srivastava.

('In case, any change or modification is prescribed by Central Board of studies or Higher Education Deptt., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syilabi, it will be implemented accordingly.')

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose....................
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Subject Expert..	3 Dr.R.S.Singh.................................
Alumni (member)..	4. Dr. Anita Shukla............................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar............
Specialist from Industry.............................	6. Dr. Abhishek Kumar Misra..............

Course Outcomes:

1. The laws of thermodynamics- zeroth law, concept of path function and point function, first law, internal energy as a state function, reversible and irreversible change, Carnot theorem and second law, Claussius theorem inequality. Entropy, change of entropy in simple cases The thermodynamic scale of temperature, its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics.

2. Thermodynamic variables, Maxwell's general relationships, Vander waal's gas, Clausiuss-Clapeyron heatequation. Thermodynamic potentials and relation with thermodynamical variables. Cooling due to adiabatic demagnetization, Black body radiation: Stefan – Boltzmann law, spectral distribution, Wien's displacement law, Rayleigh jean's law, Planck's quantum postulates, Planck's Law.

3. Maxwellian distribution of speeds and of velocities, experimental verification, distinction between mean, r.m.s. and most probable speed values. Doppler broadening of spectral lines.

4. Molecular collisions, mean free path and collision cross sections, estimates of molecular diameter and mean free path, Transport of mass, momentum and energy and inter- relationship.Boyle temperature and inversion temperature, liquefaction of hydrogen and helium. Refrigeration cycles, meaning of efficiency.

5. The statistical basis of thermodynamics: thermodynamic probability, statistical postulates. Concept of Gibb's ensemble,Concept of phase space, canonical phase space, γ phase space and μ phase space. Boltzmann canonical distribution law and its application, law of equipartition of energy. Transition to quantum statistics: 'h' as a natural constant and its effects, cases of particle in a one dimensional box and one dimensional harmonic oscillator.

6. Indistinguishability of particles, Bose Einstein and Fermi Dirac conditions, concept of partition function, Derivation of Maxwell Boltzmann, Bose Einstein and Fermi Dirac statistics through canonical partition function. Limits of B.E.and F.D. statistics to M.B. statistics. Application of B.E. statistics and F.D.statistics.

<table>
<tr><td>V.C. Nominee ....</td><td>Departmental members
1. H.O.D/Dr. Purna Bose..................</td></tr>
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<tr><td>Prof. from other Dept. Of Sc. Faculty ....</td><td>5. Mrs. Siteshwari Chandrakar...........</td></tr>
<tr><td>Specialist from Industry...........................</td><td>6. Dr. Abhishek Kumar Misra...........</td></tr>
</table>

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
A (Very short Answer)	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
C (Long Answer)	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

V.C. Nominee ....

Subject Expert ....

Subject Expert...

Alumni (member)......................................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry............................

Departmental members
1. H.O.D/Dr. Purna Bose...........................

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6. Dr. Abhishek Kumar Misra......................

24

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।

2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिष्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करों ' जैसे प्रश्न भी नहीं होंगे।)

3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 शब्दों में देना होगा।

4. खण्ड स में दीर्घ उत्तरी / निबंधात्मक प्रश्न होंगे। विद्यार्थियों को अधिकतम 350 शब्दों में सटीक उत्तर लिखना होगा।

5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्रश्न का प्रकार	पूर्णांक 33 (अंक x प्रश्नों की संख्या)	पूर्णांक 34 (अंक x प्रश्नों की संख्या)	पूर्णांक 50 (अंक x प्रश्नों की संख्या)	पूर्णांक 75 (अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्रश्न	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

V.C. Nominee ....

Subject Expert ....

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Alumni (member)..................

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Specialist from Industry..................

Departmental members
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GOVT.V.Y.T.AUTO.PG COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021–2022)
B. Sc. Part-II
Paper-II WAVES, ACOUSTICS AND OPTICS

UNIT-1

Waves in media: Speed of transverse waves on uniform string, speed of longitudinal waves in a fluid, energy density and energy transmission in waves. Waves over liquid surface: gravity waves and ripples. Group velocity and phase velocity and relationship between them. Production and detection of ultrasonic and infrasonic waves and applications.

Reflection, refraction and diffraction of sound: Acoustic impedance of a medium, percentage reflection & refraction at a boundary, impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

UNIT-2

Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications. Cardinal points of an optical system, thick lens and lens combinations. Lagrange equation of magnification, telescopic combinations, telephoto lenses. Monochromatic aberrations and their reductions; aspherical mirrors and Schmidtcorrector plates, a planatic points, oil immersion objectives, meniscus lens. Optical instruments: Entrance and exit pupils, need for a multiple lens eyepiece, common types of eyepieces. (Ramsdon and Hygen's eyepieces).

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose......................
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Alumni (member)...............................	4. Dr. Anita Shukla........................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar..........
Specialist from Industry......................	6. Dr. Abhishek Kumar Misra............

UNIT-3

Interference of light: The principle of super positions, two slit interference, coherence requirement for the sources, optical path retardations, Conditions for sustained interference, Theory of interference, Thin films. Newton's rings and Michelson interferometer and their applications its application for precision determinations of wavelength, wavelength difference and the width of spectral lines. Multiple beam interference in parallel film and Fabry-Perot interferometer. Rayleigh refractometer, Twyman-Green interferometer and its uses.

UNIT-4

Diffraction, Types of Diffraction, Fresnel's diffraction, half-period zones, phasor diagram and integral calculus methods, the intensity distribution, Zone plates, diffraction due to straight edge, Fraunhofer diffraction due to a single slit and double slit, Diffraction at N Parallel slit, Plane Diffraction grating, Rayleigh criterion, resolving power of grating, Prism, telescope.

Polarized light and its mathematical representation, Production of polarized light by reflection, refraction and scattering. Polarization by double refraction and Huygen's theory, Nicol prism, Retardation plates, Production and analysis of circularly and elliptically polarized light. Optical activity and Fresnel's theory, Biquartz polarimeter.

UNIT-5

Laser system: Basic properties of Lasers, coherence length and coherence time, spatial coherence of a source, Einstein's A and B coefficients, Spontaneous and induced emissions, conditions for laser action, population inversion, Types of Laser: Ruby and, He-Ne laser and. Applications of laser: Application in communication, Holography and Basics of non linear optics and Generation of Harmonic.

V.C. Nominee	Departmental members
	1. H.O.D/Dr. Purna Bose........................
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Specialist from Industry.......................	6. Dr. Abhishek Kumar Misra............

TEXT AND REFERENCE BOOKS:

1. A.K. Ghatak, ' Physical Optics'
2. D.P. Khandelwal, Optical and Atomic Physics ' (Himalaya Publishing House, Bombay, 1988).
3. K.D. Moltev;' Optics ' (Oxford University Press)
4. Sears:' Optics '
5. Jenkins and White:' Fundamental of Optics ' (McGraw-Hill)
6. B.B. Laud: Lasers and Non-linear Optics (Wiley Eastern 1985)
7. Smith and Thomson:' Optics ' (John Wiley and Sons)
8. Berkely Physics Courses: Vol.-III,' Waves and Oscillations '
9. I.G. Main,' Vibrations and Waves ' (Cambridge University Press)
10. H.J. Pain:' The Physics of Vibrations and Waves ' (MacMillan 1975)
11. Text Book of Optics: B.K. Mathur
12. B.Sc. (Part III) Physics: Editor: B.P. Chandra, M.P. Hindi Granth Academy.
13. F. Smith and J.H. Thomson, Manchester Physics series: optics (John Wiley, 1971)
14. Born and Wolf:' Optics '.
15. Physical Optics: B. K. Mathur and T. P. Pandya.
16. A textbook of Optics: N. Subrahmanyam, Brijlal and M. N. Avadhanulu.
17. Geometrical and Physical Optics: Longhurst.
18. Introduction to Modern Optics: G. R. Fowels.
19. Optics: P. K. Srivastav.

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Course Outcomes:

1. Speed of transverse waves on a uniform string, longitudinal waves in a fluid. Energy density and energy transmission, gravity waves and ripples. Group velocity and phase velocity and their measurements, Harmonics and production and detection of ultrasonic and infrasonic waves and their application.

2. Reflection, refraction and diffraction of sound: impedance matching for transducers, diffraction of sound, principle of a sonar system, sound ranging.

3. Fermat's Principle of extremum path, the aplanatic point of a sphere and other applications, Cardinal Points Lagrange's equation of magnification, telescopic combinations, monochromatic aberrations, aspherical mirrors and Schmidt corrector plates, Ramsdon and Hygen's eyepieces.

4. The principle of superposition, two slit interference, coherence, Rayleigh refractometer, localized fringes, thin films,

5. Haldinger fringes:, Michelson interferometer, its application Twymann- green interferometer and its uses, Tolansky fringes, Febry –Perot interferometer and etalon.

6. Fresnel half period zones, zone plates, Fraunhoffer resolution of images, Rayleigh criterion.

7. Diffraction gratings: Diffraction at N parallel slits, plane diffraction grating, resolving power of a grating and comparison with resolving power of prism and of a Fabry-Perot etalon.

8. Double refraction and optical rotation: rotation of plane of polarization, origin of optical rotation in liquids and in crystals.

9. 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 emissions, conditions for laser action, population inversion, types of laser: Ruby and He-Ne semiconductor lasers.

10. Application of laser in communication, Holography and non-linear optics

Name and Signatures

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose...............
Subject Expert	2. Dr. Jagjeet Kaur Saluja...............
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Question Paper Format and Distribution of Marks for Under Graduate Examination

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2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
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4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
A (Very short Answer)	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
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स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।

2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिष्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करों' जैसे प्रश्न भी नहीं होंगे।)

3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 भाब्दों में देना होगा।

4. खण्ड स में दीर्घ उत्तरी / निबंधात्मक प्रश्न होंगे। विद्यार्थियों को अधिकतम 350 भाब्दों में सटीक उत्तर लिखना होगा।

5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्रश्न का प्रकार	पूर्णांक 33 (अंक x प्रश्नों की संख्या)	पूर्णांक 34 (अंक x प्रश्नों की संख्या)	पूर्णांक 50 (अंक x प्रश्नों की संख्या)	पूर्णांक 75 (अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्रश्न	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose...............
Subject Expert	2. Dr. Jagjeet Kaur Saluja...............
Subject Expert................................	3 Dr.R.S.Singh...................
Alumni (member)................................	4. Dr. Anita Shukla...................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar...........
Specialist from Industry................	6. Dr. Abhishek Kumar Misra...........

LIST OF EXPERIMENTS

Minimum 16 (Sixteen) out of the following or similar experiments of equal standard:-

1. Study of Brownian motion.
2. Study of adiabatic expansion of a gas.
3. Study of conversion of mechanical energy into heat.
4. Heating efficiency of electrical kettle with varying voltage.
5. Study of temperature dependence of total radiation.
6. Study of temperature dependence of special density of radiation.
7. Resistance thermometry.
8. Thermo emf thermometry.
9. Conduction of heat through poor conductors of different geometries.
10. Experimental study of probability distribution for a two option system using a coloured dice.
11. Study of statistical distribution on nuclear disintegration data (GM counter used as a black box).
12. Speed of waves on a stretched string.
13. Studies on torsional waves in a lumped system.
14. Study of interference with two coherent sources of sound.
15. Chlandi's figures with varying excitation and loading points.
16. Measurement of sound intensities with different situation.
17. Characteristics of a microphone –loudspeaker system.
18. Designing and an optical viewing system.
19. Study of monochromatic defects of images.
20. Determining the principle points of a combination of lenses.

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose................................
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Specialist from Industry...............................	6. Dr. Abhishek Kumar Misra.....................

21. Study of interference of light (biprism of wedge film).
22. Study of diffraction at a straight edge or a single slit.
23. Study of F – P etalon fringes.
24. Use of diffraction grating and its resolving limit.
25. Resolving limit of a telescope system.
26. Polarization of light by reflection; also cos – squared law.
27. Calculation of days between two dates of a year.
28. To check if triangle exists and the type of the triangle.
29. To find the sum of the since and cosine series and print out the curve.
30. To solve simultaneous equations by elimination method.
31. To prepare a mark list of polynomials.
32. Fitting a straight line or a simple curve to a given data.
33. Convert a given integer into binary and octal systems and vi versa.
34. Inverse of matrix.
35. Spiral array.

TEXT AND REFERENCE BOOKS:

1. D. P. Khandelwal; "Optical and Atomic Physion" (Himalaya Publishing House, Bombay 1988).
2. D.P. Khandelwal; "A Laboratory annual for Undergraduate classes" (Vani Publishing House, New Delhi.).
3. S. Lipsehutz and A Poe; "Schaum's Outline of Theory and Problems of programming with fortran"(McGraq – Hill Book Company 1986).
4. Dixon; "Numerical analysis".

Course Outcomes:
Students are familiarized with practicals based on heat and optics which are useful in our daily life.

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose.............
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Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar.............
Specialist from Industry.............	6. Dr. Abhishek Kumar Misra.............

Syllabus and Marking Scheme for B.Sc. FINAL YEAR

Session (2021–2022)

Paper No.	Title of the Paper	Marks Allotted in Theory	
		Max	Min
I	RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND NUCLEAR PHYSICS.	50	17
II	SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS	50	17
III	Lab course/ Practical	50	17
	Total	150	

02 Theory papers   -   100

01 Practical   -   50

Total Marks   -   150

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose...................
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Subject Expert...............................	3 Dr.R.S.Singh...............................
Alumni (member)...............................	4. Dr. Anita Shukla...............................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar...............
Specialist from Industry...............................	6. Dr. Abhishek Kumar Misra...............

GOVT. V. Y. T. AUTO. PG COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021–2022)
B.Sc. III PHYSICS
Paper-I
RELATIVITY, QUANTUM MECHANICS, ATOMIC MOLECULAR AND
NUCLEAR PHYSICS

UNIT-1

Reference systems, inertial frames, Galilean invariance propagation of light, Michelson-Morley experiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction, time dilation, velocity addition, variation of mass with velocity, mass-energy equivalence, particle with zero rest mass.

UNIT-2

Origin of the quantum theory : Failure of classical physics to explain the phenomena such as black-body' spectrum,' photoelectric effect, Compton effect, Wave-particle duality, uncertainty principle, de Broglie's hypothesis for matter waves, the concept of Phase and group velocities, experimental demonstration of matter waves. Davisson and Germer's experiment. Consequence of de Broglie's concepts, Bohr's complementary Principle, Bohr's correspondence principle, Bohr's atomic model, energies of a particle in a box, wave packets. Consequence of the uncertainty relation, gamma ray microscope, diffraction at a slit.

V.C. Nominee	Departmental members
Subject Expert	1. H.O.D/Dr. Purna Bose........................
Subject Expert............................	2. Dr. Jagjeet Kaur Saluja................
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Prof. from other Dept. Of Sc. Faculty	4. Dr. Anita Shukla........................
Specialist from Industry............................	5. Mrs. Siteshwari Chandrakar........
	6. Dr. Abhishek Kumar Misra........

UNIT-3

Quantum Mechanics: Schrodinger's equation, Statistical interpretation of wave function, Orthogonality and normalization of wave function, Probability current density, Postulatory basis of quantum mechanics, operators, expectation values. Ehrenfest's theorem, 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.

UNIT-4

Spectra of hydrogen, deuteron and alkali atoms spectral terms, doublet fine structure, screening constants for alkali spectra for s, p, d and f states, selection rules. Discrete set of electronic energies of moleculers, quantisation of vibrational and rotational energies, determination of inter-nuclear distance, pure rotational and rotation 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 Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

UNIT-5

Structure of nuclei:- Basic Properties of Nuclei: (1) Mass (2) Radii, (3) Charge, (4) Angular Momentum, (5) Spin, (6) Magnetic Moment (μ). (6) Stability and) Binding Energy, Nuclear Models:- Liquid Drop Model, Mass formula. Shell Model, Types of Nuclear reactions, laws of conservation, Q-value of reactions. Interaction of Energetic particles with matter, Ionization chamber, GM Counter, Cloud Chambers, Fundamental Interactions, Classification of Elementary Particles, Particles and Antiparticles, Baryons, Hyperons, Leptons, and Mesons, Elementary Particle Quantum Numbers: Baryon Number, Lepton Number, Strangeness, Electric Charge, Hypercharge and Isospin, introductory idea of discovery of Higg's Boson.

	Departmental members
V.C. Nominee	1. H.O.D/Dr. Purna Bose....................
Subject Expert	2. Dr. Jagjeet Kaur Saluja..................
Subject Expert....................................	3 Dr.R.S.Singh..............................
Alumni (member)................................	4. Dr. Anita Shukla..........................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar............
Specialist from Industry........................	6. Dr. Abhishek Kumar Misra..............

TEXT AND REFERENCE BOOK:

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. HE. White, Introduction to Atomic Physic"
4. Barrow, "Introduction to Molecular Physics".
5. RP. Feynman, R.B. Leighton and M Sands, "The Feynman Lectures on Physics", Vol.III (BLL Publications, Bombay, Delhi, Calcutta, Madras).
6. T.A. Littlefield and N Thorley, "Atomic and Nuclear Physics" (Engineering Language Book Society)
7. HLA. Enge, "Introduction to Nuclear Physics", (Addision-Wesly)
8. Bisenberg and Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles" (John Wiley)
9. D.P. Khandelwal, "Optics and Atomic Physics", (Himalaya Publishing House, Bombay, 1988).
10. Quarks and Leptons, F. Halzen and A.D. Martin, Wiley India, New Delhi, 1984.
11. Radiation detection and measurement, G.F. Knoll (John Wiley & Sons, 2000).
12. Theoretical Nuclear Physics, J.M. Blatt & V-F.Weisskopf (Dover Pub.Inc., 1991).

('In case, any change or modification is prescribed by Central Board of studies or Higher Education Deptt., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.')

Name and Signatures

V.C. Nominee	Departmental members 1. H.O.D/Dr. Purna Bose.........................
Subject Expert	2. Dr. Jagjeet Kaur Saluja......................
Subject Expert................................	3 Dr.R.S.Singh...............................
Alumni (member).............................	4. Dr. Anita Shukla.........................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar..............
Specialist from Industry.........................	6. Dr. Abhishek Kumar Misra.............

Course Outcomes:

1. Reinternal frames. Galilean invariance and conservation laws, Michelson-Morley exexperiment, search for ether. Postulates for the special theory of relativity, Lorentz transformations, length contraction time dilation, velocity addition theorem, variation of mass –energy equivalence, particle with a zero rest, Compton effect.

2. Origin of the quantum theory: failure of classicalphysics, photoelectric effect.Wave-particle duality and uncertainty principle: de Broglie's hypothesis for matter waves. Davission and Germer's experiment. Consequence of de Broglie's concepts. Quantum mechanics: Schrodinger's equation postulates of quantum mechanics, operators, expectation values, boxes, harmonic oscillator, potential step, potential barrier, Hydrogen atom: natural occurrence of n, I and m quantum numbers

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

4. Quantization of vibrational and rotational energies, determination of internuclear distance, pure rotational and rotation vibration spectra. Dissociation limit for the ground and other electronic states, transition rule for pure vibration and electronic vibration spectra. Raman effect, Stokes and anti-Stoke lines, complimentary charcter of Raman and infrared spectra, experimental arrangements for Raman spectroscopy.

5. Interaction of charged particles and neutrons with mater, working of nuclear detectors, G-M counter, proportional counter and scintillation counter, cloud chambers, spark chamber, emulsions. Structure of nuclei, basic properties 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 beta decay, alpha decay, continuous and discreate spectra. Nuclear reactions, channels, compound nucleus, direct reaction (concepts). Shell model & liquid drop modal, fission and fusion (concepts), energy production in stars by p-p and carbon cycles (concepts).

V.C. Nominee	**Departmental members** 1. H.O.D/Dr. Purna Bose...............
Subject Expert	2. Dr. Jagjeet Kaur Saluja............
Subject Expert.......................	3 Dr.R.S.Singh.......................
Alumni (member).......................	4. Dr. Anita Shukla...................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar........
Specialist from Industry...............	6. Dr. Abhishek Kumar Misra.........

Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
A (Very short Answer)	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
C (Long Answer)	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

V.C. Nominee ....

Subject Expert ....

Subject Expert..............................

Alumni (member)............................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry...............................

Departmental members
1. H.O.D/Dr. Purna Bose.........................
2. Dr. Jagjeet Kaur Saluja.....................
3 Dr.R.S.Singh............................
4. Dr. Anita Shukla............................
5. Mrs. Siteshwari Chandrakar................
6. Dr. Abhishek Kumar Misra....................

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।
2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिष्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करों ' जैसे प्रश्न भी नहीं होंगे।)
3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 शब्दों में देना होगा।
4. खण्ड स में दीर्घ उत्तरी / निबंधात्मक प्रश्न होंगे। विद्यार्थियों को अधिकतम 350 शब्दों में सटीक उत्तर लिखना होगा।
5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्रश्न का प्रकार	पूर्णांक 33 (अंक x प्रश्नों की संख्या)	पूर्णांक 34 (अंक x प्रश्नों की संख्या)	पूर्णांक 50 (अंक x प्रश्नों की संख्या)	पूर्णांक 75 (अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्रश्न	3x5 = 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

V.C. Nominee ....

Subject Expert ....

Subject Expert...........................

Alumni (member).........................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry...........................

Departmental members
1. H.O.D/Dr. Purna Bose.................

2. Dr. Jagjeet Kaur Saluja................

3 Dr.R.S.Singh...........................

4. Dr. Anita Shukla......................

5. Mrs. Siteshwari Chandrakar..........

6. Dr. Abhishek Kumar Misra.............

GOVT.V.Y.T.AUTO.PG COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021–2022)
Class: B.Sc. III
PHYSICS
Paper-II
SOLID STATE PHYSICS, SOLID STATE DEVICES AND ELECTRONICS

UNIT-1

Amorphous and crystalline solids, Elements of symmetry, Seven crystal system, Cubic lattices, Crystal planes, Miller indices, Laue's equation for X-ray diffraction, Brage's Law, Bonding in solids, classification. Cohesive energy of solid, Madelung constant, evaluation of Parameters, Specific heat of solids, classical theory (Dulong-Petit's law), Einstein and Debye theories, Vibrational modes of one dimensional monoatomic lattice, Dispersion relation, Brillouin Zone.

UNIT-2

Free electron model of a metal, Solution of one dimensional Schrodinger equation in a constant potential, Density of states, Fermi Energy, Energy bands in a solid (Kronig-Penny model without mathematical details), Difference between Metals, Insulator and Semiconductors, Hall effect, Dia, Para and Ferromagnetism, Langevin's theory of dia and para-magnetism, Curie- Weiss's Law, Qualitative description of Ferromagnetism (Magnetic domains), B-H curve and Hysteresis loss.

UNIT-3

Intrinsic and_ extrinsic semi conductors, Concept of Fermi level, Generation and recombination of electron hole pairs in semiconductors, Mobility of electrons and holes, drift and diffusion currents, p-n junction diode, depletion width and potential barrier, junction capacitance, I-V characteristics, 'Tunnel diode, Zener diode, Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configurations, current amplification factor, FET and MOSFET Characteristics.

	Departmental members
V.C. Nominee	1. H.O.D/Dr. Purna Bose....................
Subject Expert	2. Dr. Jagjeet Kaur Saluja................
Subject Expert................................	3 Dr.R.S.Singh................................
Alumni (member)............................	4. Dr. Anita Shukla..........................
Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar.........
Specialist from Industry........................	6. Dr. Abhishek Kumar Misra..........

UNIT-4

Half and fall wave rectifier, rectifier efficiency ripple Factor, Bridge rectifier, Filters, Inductor filter, L and i section filters, Zener diode, regulated power supply using zener diode, Applications of transistors, Bipolar Transistor as amplifier, h-parameter, h-parameter equivalent circuit, Transistor as power amplifier, Transistor as oscillator, principle of an oscillator and Bark Hausen's condition, requirements of an oscillator, Wein-Bridge oscillator and Hartley oscillator

UNIT-5

Digital Circuits: Difference between Analog and Digital Circuits, Binary Numbers, Decimal to Binary and Binary to Decimal Conversion, AND, OR and NOT Gates (Realization using Diodes and Transistor), NAND and NOR Gates as Universal Gates, XOR and XNOR Gate, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuit using Boolean Algebra, Digital to Analog Converter, Analog to Digital Converter.

TEXT AND REFERENCE BOOK:

1. Introduction to solid state physics, C. Kittel.
2. Solid State Physics: A.J. Dekkar.
3. Electronic Circuits: Mottershead.
4. Electronic Circuits: Millman and Halkias.
5. Semiconductor Devices: SM. Sze.
6. Electronic devices: T.L. Floyd
7. Device and Circuits: J. Millman and C. Halkias.
8. Electronic Fundamental and Applications: D. Chatopadhyay and P.C. Rakshit,
9. Electricity and Magnetism: K.K. Tiwari.

V.C. Nominee	**Departmental members**
	1. H.O.D/Dr. Purna Bose........................
Subject Expert	2. Dr. Jagjeet Kaur Saluja..................
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Prof. from other Dept. Of Sc. Faculty	5. Mrs. Siteshwari Chandrakar............
Specialist from Industry.........................	6. Dr. Abhishek Kumar Misra..............

Course Outcomes:

1. Elements of symmetry, Seven System, Cubic lattices, Crystal planes, miller indices, Laue's equation for X-ray diffraction, Bragg's law, Bonding in solids classification. Specific heat of solids, Dulong-petit's law, Einstein and Debye theories. Brillouin zone.

2. Schrodinger equation in a constant potential. Density of states. Fermi Energy. Energy bands in solid, Kroning penny model Metals, insulator and semiconductors. Hall effect. Dia, Para and ferromagnetism. Langevin's theory of dia and para-magnetism.

3. Curieweiss's law. Qualitative description of ferromagnetism (magnetic domains) B-H.curve and Hysteresis loss.

4. Intrinsic semiconductor, carrier concentration in thermal equlibrium, Fermi level, impurriy, doped semiconductor, doner and acceptor levels, Diode equation, junction breakdown, Depletion width and junction capacitance, abrupt junction breakdown, Tunnel diode, Zener diode. Light emitting diode, solar cell, Bipolar transistors, pnp and npn transistors, characteristics of transistors, different configuration, current amplification factor, FET.

5. Half and full wave rectifier, efficiency, ripple factor, Filters, Inductor filter, T and π filters, Zener diode, regulated power supply. Applications of Transistors. Bipolar Transistor as amplifier. Single stage and CE small signal amplifiers, Emitter follower, transistor power amplifier, Transistor as oscillator, Wein-Bridge and Hartley oscillator.

('In case, any change or modification is prescribed by Central Board of studies or Higher Education Deptt., Govt. of Chhattisgarh with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.')

V.C. Nominee	**Departmental members** 1. H.O.D/Dr. Purna Bose...................
Subject Expert	2. Dr. Jagjeet Kaur Saluja..............
Subject Expert...	3 Dr.R.S.Singh..............................
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3. Section B shall contain short answer type questions with the limit of 150 words.
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Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
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B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
C (Long Answer)	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

V.C. Nominee ....

Subject Expert ....

Subject Expert...................................

Alumni (member)...................................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry...................................

Departmental members
1. H.O.D/Dr. Purna Bose...................................

2. Dr. Jagjeet Kaur Saluja...................................

3 Dr.R.S.Singh...................................

4. Dr. Anita Shukla...................................

5. Mrs. Siteshwari Chandrakar...................................

6. Dr. Abhishek Kumar Misra...................................

44

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।

2. खण्ड अ में अतिलघूत्तरी प्रश्न (एक या दो वाक्यों में उत्तर) या वस्तुनिष्ठ प्रश्न होंगे। (बहुविकल्पीय प्रश्न नहीं होंगे। 'रिक्त स्थानों की पूर्ति करों' जैसे प्रश्न भी नहीं होंगे।)

3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 शब्दों में देना होगा।

4. खण्ड स में दीर्घ उत्तरी/निबंधात्मक प्रश्न होंगे। विद्यार्थियों को अधिकतम 350 शब्दों में सटीक उत्तर लिखना होगा।

5. प्रश्नपत्र का प्रारूप एवं अंक विभाजन निम्नानुसार होगा :

प्रश्न का प्रकार	पूर्णांक 33 (अंक x प्रश्नों की संख्या)	पूर्णांक 34 (अंक x प्रश्नों की संख्या)	पूर्णांक 50 (अंक x प्रश्नों की संख्या)	पूर्णांक 75 (अंक x प्रश्नों की संख्या)
अतिलघूत्तरी प्रश्न	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
लघूत्तरी प्रश्न	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
दीर्घ उत्तरी प्रश्न	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. अर्द्धवार्षिक आंतरिक मूल्यांकन परीक्षा आयोजित होगी। इस परीक्षा में प्रत्येक प्रश्नपत्र के प्राप्तांक का 10% वार्षिक परीक्षा के प्रत्येक प्रश्नपत्र में प्राप्त अंको के 90% के साथ जोड़ा जाएगा।

<table>
<tr><td>

V.C. Nominee ....

Subject Expert ....

Subject Expert..........................

Alumni (member)..........................

Prof. from other Dept. Of Sc. Faculty ....

Specialist from Industry..........................

</td><td>

Departmental members
1. H.O.D/Dr. Purna Bose..........................

2. Dr. Jagjeet Kaur Saluja..........................

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45

GOVT.V.Y.T.AUTO.PG COLLEGE, DURG (C.G)
SYLLABUS FOR: (2021-2022)
Class: B.Sc. III
PHYSICS

LIST OF EXPERIMENTS

MINIMUM 16 (Sixteen) out of following or similar experiment of equal standard:

1. Determination of Planck's constant.
2. Determination of e/m by using Thomson's tube.
3. Determination of e by Millikan's methods.
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 alkali or earth spectra using a concave gra's.
7. Study of Zeeman effect for determination of Lande g-factor.
8. Analysis of 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 curve of transformer core.
15. Hall-probe method for measurement of magnetic field.
16. Specific resistance and energy gap of a semiconductor.
17. Characteristics of transistor.
18. Characteristics of tunnel diode.
19. Study of voltage regulation system.
20. Study of a regulated power supply.
21. Study of lissajous figures using CRO.

	Departmental members
V.C. Nominee	1. H.O.D/Dr. Purna Bose.........................
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Subject Expert.............................	3 Dr.R.S.Singh.............................
Alumni (member).............................	4. Dr. Anita Shukla.............................
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Specialist from Industry.............................	6. Dr. Abhishek Kumar Misra.............

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 Network-Raphson method.
26. Find roots of F (X)=0 by using secant method.
27. Integration by Simpson rule.
28. Towers of Hanoi (Nonrecursive).
29. Finding first four perfect numbers.
30. Quaddratic interpolation using Network's forward-difference formula of degree two.

C. Programming

31. To write a program for simple interest.
32. To write a program to print two numbers.
33. To write a program to print numbers in ascending order.
34. To write a program to print numbers in Descending order.
35. To write a program to insert three numbers and find out the largest one.
36. To write a program to insert an integer numbers and find out even or odd numbers.
37. To write a program for finding simple interest for three set of Capital rate, rate of percentage and years.

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47

TEXT AND REFFERANCE BOOKS:

1. B.G.Streej.am; "solid state electronic devices" II Edition (Prentice-Hall of India, New Delhi,1986)
2. W.D. Stanley; "Electronic devices, circuits and applications" (Prentice Hall, New jersey. USA 1988)
3. S.Lipschutsz A Poe; Schum's Outline of theory and problems of programming with Fortran" (McGraw-hall Book Co.Singapore 1986)
4. C.Dixon; "Numerical Analysis.

Course Outcomes:

Students are familiarized with practicals based on electronics and and computer programming and they can handle the instruments which are useful in our daily life

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Question Paper Format and Distribution of Marks for Under Graduate Examination

1. The question paper for UG Classes is to be divided into three Sections - A, B & C.
2. Section A shall contain very short answer type questions (answer in one or two sentences) or objective type questions. (No Multiple choice questions. No 'fill in the blank' type Questions)
3. Section B shall contain short answer type questions with the limit of 150 words.
4. Section C shall contain long answer/descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 350 words.
5. The scheme of marks should be as follows :

Question Type	MM 33 (Marks x No. of Questions)	MM 34 (Marks x No. of Questions)	MM 50 (Marks x No. of Questions)	MM 75 (Marks x No. of Questions)
A (Very short Answer)	8x1 = 08	1x9 = 09	1x10 = 10	1x10 = 10
B (Short Answer)	2x5 = 10	2x5 = 10	3x5 = 15	5x5 = 25
C (Long Answer)	3x5= 15	3x5= 15	5x5 = 25	8x5= 40

6. The half yearly internal examinations will be held. 10% out of marks obtained by the students in each paper in internal examinations will be added to 90% of marks obtained in each paper of annual examination.

स्नातक कक्षाओं के लिए प्रश्न पत्र का प्रारूप तथा अंक विभाजन

1. स्नातक कक्षाओं के लिए प्रत्येक प्रश्न पत्र तीन खण्डों अ, ब, स में विभाजित होगा।
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3. खण्ड ब में लघूत्तरी प्रश्न होंगे जिनका उत्तर 150 शब्दों में देना होगा।
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Name and Signatures

V.C. Nominee	Departmental members
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Subject Expert	2. Dr. Jagjeet Kaur Saluja...............
Subject Expert...............................	3 Dr.R.S.Singh.............................
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('In case, any change or modification is prescribed by **Central Board of studies** or **Higher Education Deptt. Govt. of Chhattisgarh** with respect to content or distribution of marks for Undergraduate syllabi, it will be implemented accordingly.')

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Program Outcomes:

The syllabi are framed in such a way that it bridges the gap between plus two and post graduate levels of Physics by providing a more complete and logical framework in almost all areas of basic Physics:

1. To develop in students, the knowledge in students about the importance and scope of the subject.
2. To prepare students to have basic knowledge of physics.
3. To equip students to handle the apparatus used in our daily life. To prepare students for a variety of carrier options in the field of Physics.
4. To develop critical thinking skills in students
5. To familiarize the students with the emerging areas of Physics and their applications in various areas of Physical Sciences.to expose the students to use different processes used in the industry according to the preset requirement.
6. To attract young minds to the potentially rich and employable field of Physics.
7. To develop the skill to handle common apparatus of Physics.
8. To develop skill in in practical work, experiments and laboratory use of Physics.
9. To be able to work independently and to collaborate effectively in team work and team building.

In this way the course provides with ample opportunities for the student to learn about the basic laws of Physics and how to handle the instruments and proper functioning of the simple instruments.

To gain practical experience.

At the end of the third year of the B.Sc. course the students will learn about basics of Mechanics, Vectors, Electricity, Magnetism, Thermodynamics, Statistical Mechanics, Optics, Electronics, Quantum Mechanics and Nuclear Physics.

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