

**SCHEME OF EXAMINATION**  
**&**  
**SYLLABUS OF**  
**Choice Based Credit System**  
**(PHYSICS)**

UNDER

**FACULTY OF SCIENCE**

**Approved by Board of Studies in Physics**

**EFFECTIVE FROM JULY 2023**

**(Valid for 2 Years 2023-2025)**



**School of Studies in Physics & Astrophysics**

**Pt. Ravishankar Shukla University**

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Approved by Board of Studies in Physics on 16 January, 2023

**PT. RAVISHANKAR SHUKLA UNIVERSITY, RAIPUR**

## Choice Based Credit System (CBCS)

In the CBCS scheme all the courses offered at P.G. level are under semester system. Semester system is applicable to regular students of affiliated colleges and Autonomous colleges of this University and different SoS of Pt. Ravishankar Shukla University, Raipur. Course structure along with distribution of marks is given below:

Name of the Paper	Marks					Credits
	Theory		Internal		Total	
	Max	Min	Max	Min		
Semester-I Paper-I: Basic Concepts of Physics and Astrophysics	80	16	20	04	100	03
Semester-II Paper-II: Basic Concepts of Optics	80	16	20	04	100	03

**Note: Any one of the paper chosen by the students for CBCS will have 03 credits.**

अध्ययनशाला का नाम	–	भौतिकी एवं खगोल भौतिकी अध्ययनशाला
पाठ्यक्रम	–	च्चायस बेस्ड पाठ्यक्रम द्वितीय सेमेस्टर
प्रश्नपत्र का नाम	–	<b>Paper-I: Basic Concepts of Physics and Astrophysics</b>
कुल क्रेडिट: 03		कुल अंक: 100

**Choice Based Credit Course**

**Semester –I**

**Paper I- Basic Concepts of Physics and Astrophysics**

**Total Credit- 03, Total Marks: 100 [80+20]**

**Mechanical Properties of Matter:** Newton laws of motion; Kepler’s laws of planetary motion; Friction; Conservative & non-conservative forces; Work and Energy: kinetic and potential energy; Law of conservation of Energy, power; Elasticity; Surface tension, Viscosity, Equation of continuity, Bernoulli’s theorem and its application.

**Thermal Properties of Matter:** Heat and temperature; Thermal expansion; Specific heat capacity; Latent heat; Calorimetry; Transfer of heat; Thermal conductivity; Thermal radiation; Black body radiation; Kirchhoff’s law; Stefan’s law; Newton’s law of cooling; Perfect gas; Boyle’s law, Charles’s law, Kinetic theory of gases.

**Electricity and Magnetism:** Coulomb’s law; Electrostatic force; Electric field; Electric Potential; Work done on a charge in an electrostatic field; Lines of force & Electric Flux; Gauss law; Dielectrics; Electric Susceptibility; Permittivity and Dielectric constant; Biot-Savart Law; Lorentz force; Ampere law; Time varying fields; Magnetization; Electromagnetic induction; Faraday law.

**Digital Electronics:** Number systems; decimal, binary, octal, hexadecimal and their conversion; Logic gates: AND, OR, NOT, NAND, NOR, EX-OR gates and their logic symbols/ equivalent simplified switching circuits/ truth tables; Boolean algebra; De- Morgan theorems; Half and Full Adder circuits.

**Astronomy & Astrophysics:** Time and Coordinate system; Celestial Sphere; Solar Time; Sidereal Time; Julian Date; Right Ascension and Declination; Azimuth and Elevation; Optical telescopes; Apparent Magnitude; Absolute magnitude; Colour Index; Luminosity; Stellar Distances; Spectral classification; The H-R diagram of stars.

**REFERENCE BOOKS:**

1. Fundamental of Physics, Halliday, Resnick & Walker, Wiley publication.
2. University Physics, Shears & Zimanski.
3. Basic electronics, V.K.Mehta.
4. Classical Electrodynamics, J. D. Jackson, J. Wiley & Sons.
5. Astrophysics for Physicists, Arnab Rai Choudhuri, Cambridge University Press.
6. Modern Astrophysics, B.W. Carroll and D.A. Ostlie, Addison-Wiley Publishing Co.
7. Introductory Astronomy and Astrophysics, M. Zeilik and S.A. Gregory, Saunders College Publishing.
8. The Physical Universe: An introduction to astronomy, F. Shu, Mill Valley University Sciences books.

अध्ययनशाला का नाम	–	भौतिकी एवं खगोल भौतिकी अध्ययनशाला
पाठ्यक्रम	–	च्चायस बेस्ड पाठ्यक्रम तृतीय सेमेस्टर
प्रश्नपत्र का नाम	–	<b>Paper-II: Basic Concepts of Optics</b>
कुल क्रेडिट: 03		कुल अंक: 100

**Choice Based Credit Course**  
**Semester –II**  
**Paper II- Basic Concepts of Optics**  
**Total Credit- 03, Total Marks: 100 [ 80+20 ]**

**Light and Optics:** Nature of light; Optical Path; Reflection, Refraction, Refractive index, Dispersion and dispersive power; Achromatic prisms: Deviation without dispersion; Dispersion with no deviation in prismatic combination.

**Interference:** Interference of light; Young's experiment; Analytical treatment of Interference (wave theory); Condition for interference; Interference and conservation of energy; Fringe-width and shape of fringes in double slit; White light fringes: Colour effect; Newton's rings: Applications of Newton's rings.

**Diffraction:** Diffraction, Distinction between Interference and diffraction; Classes of diffraction; Fresnel's half-period zones: Plane wave-front; Diffraction at a straight edge; Diffraction at a single slit; Diffraction at a double slit; Resolving power of grating; Resolving power of a prism(spectrograph); Resolving power of telescope; Resolving power of microscope.

**Polarisation:** Polarisation of light; Experiment to show transverse nature of light waves; Polarisation by reflection: Brewster's law; Double refraction; Ordinary and extra-ordinary rays; Uniaxial and Biaxial Crystal and their refractive indices.

**Luminescence:** Source of light; Incandescence, Luminescence, Fluorescence, Phosphorescence; Broad classification of luminescence.

**Laser:** Ordinary and Laser light; Einstein theory: Interaction of radiation with matter; Einstein's coefficients; Conditions for Laser Production: Population inversion, Pumping, Resonance Cavity; Laser system: Solid, Liquid, Gas; Applications of Laser.

**REFERENCE BOOKS:**

1. Physics part-I by R. Resnick and D. Halliday, Wiley Eastern Ltd, New Delhi.
2. Physics part-II by R. Resnick and D. Halliday, Wiley Eastern Ltd, New Delhi.
3. Laser Physics and Applications by L Tarasov, NIR Publisher Moscow.
4. Principle of Optics Eighth Edition by B. K. Mathur and T.P. Pandya, Gopal Printing Press Kanpur.
5. Optical Electronics by Ajoy Ghatak and K. Thyagarajan, Cambridge University Press.
6. A Text Book of Optics Eighth Edition N. Subramanyam and Brij Lal, S Chand Company Pvt. Ltd New Delhi.
7. Laser Systems and Applications by N. Choudhary and R. Verma, PHI Learning Pvt. Ltd New Delhi.
8. Fundamentals of Optics by Devraj Singh, PHI Learning Pvt. Ltd New Delhi.
9. Fiber Optic Communication Second Edition by D. C. Agrawal, Wheeler Publishing.