RANIGANJ GIRLS' COLLEGE
DEPARTMENT OF PHYSICS

COURSE LEARNING OUTCOMES
LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)
UNDER THE
CHOICE BASED CREDIT SYSTEM (CBCS)
OF
KAZI NAZRUL UNIVERSITY

BSc Honours in Physics

Course Learning Outcomes

Semester – I

Course Name: Mathematical Methods of Physics –I

Course Code: BSCHPHSC101

Course Type: **Core(Theoretical)**	Course Details:CC-1			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Enrich themselves with analytical tools needed for further studies in physics, like basic linear algebra, vector algebra and calculus, solutions of ordinary and partial differential equations, probability distributions, determinant and non-singular matrices.*
2. *Apply the techniques for solving different problems related to probability, differential equations, integral transform and linear algebra.*

Course Name: Mechanics

Course Code: BSCHPHSC102

Course Type: **Core(Theory and Practical)**	Course Details: **CC-2**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Understand classical mechanics of single as well as system of particles within the scope Newtonian formulation.

2. Explain general properties of bulk matter and different types of simple harmonic linear oscillations.

Semester – II

Course Name: Mathematical Methods of Physics-II

Course Code: BSCHPHSC201

Course Type: **Core (Theory & Practical)**	Course Details**: CC-3**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Work with (i) different properties of special functions, useful in other branches of Physics; (ii) Fourier expansion of analytic functions; (iii) properties of complex variables and their integrals; (iv) standard integrals.*
2. *Do computer programming using C /C++, aiming for basic mathematical problems as well as on problems based on standard numerical analysis.*

Course Name: Electricity and Magnetism

Course Code: BSCHPHSC202

Course Type: **Core (Theory & Practical)**	Course Details: **CC-4**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Discuss the properties of (i) the produced electric field due to charges at rest; (ii) the*

produced magnetic field due to steady, both in free-space and inside matter.

2. *Explain the idea of electromagnetism, through Maxwell's equation.*
3. *Analysis of electrical networks and bridges in presence of alternating currents.*

Semester-III

Course Name: Classical Mechanics and Special Theory of Relativity

Course Code: BSCHPHSC301

Course Type: **Core (Theory)**	Course Details:**CC-5**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain the classical mechanics of rotating systems and particle under central force.*
2. *Understand the Lagrangian and Hamiltonian formulations of classical mechanics.*
3. *Explain the necessity of replacing Newtonian relativity through Einstein's special relativity, and elaborate on the classical mechanics of fast particles under the special relativity.*

Course Name: Thermal Physics – I

Course Code: BSCHPHSC302

Course Type: **Core(Theory & Practical)**	Course Details: **CC-6**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Demonstrate molecular motion (kinetics) inside an ideal and a real classical gas.*
2. *Explain how the processes of heat transfer through solid, viz., conduction and radiation*

Course Name: Analog Systems and Applications

Course Code: BSCHPHSC303

Course Type: **Core** **(Theory & Practical)**	Course Details: **CC-7**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain the electronic transport mechanisms through intrinsic and extrinsic semiconductors.*
2. *Understand the theory of the transport through doped semiconductor junctions in diodes, transistors.*
3. *Use diode as rectifier and junction transistors as amplifiers.*

SKILL ENHANCEMENT COURSE (SEC-I)

Course Name: Electrical Circuit Network Skills

Course Code: BSCHPHSSEC 301

Course Type: **SEC** **(Practical)**	Course Details: **SEC-1**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Design and trouble shoots the electrical circuits, networks and appliances through hands-on mode.*
2. *Choose proper devices depending upon application considering economic and technology up gradation.*

Course Name: Technical Drawing Skills

Course Code: BSCHPHSSEC302

Course Type: **SEC (Practical)**	Course Details: **SEC-1**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Know and understand the conventions and the method of engineering drawing.*
2. *Interpret engineering drawings using fundamental technical mathematics.*
3. *Construct basic and intermediate geometry.*
4. *Improve their visualization skills so that they can apply the skill in developing new products.*
5. *Improve their technical communication skill in the form of communicative drawings.*
6. *Comprehend the theory of projection.*

Semester-IV

Course Name: Electromagnetic Theory

Course Code: BSCHPHSC401

Course Type: **Core (Theory)**	Course Details:**CC-8**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Demonstrates the theory behind the generation of the electromagnetic (transverse) progressive wave in combination of oscillating electric and magnetic fields.*
2. *Understand the basics of electromagnetic wave and its propagation through conducting and non-conducting medium and their application in modern day communication system.*
3. *Understand he theories of the manifestations by EM wave (viz., dispersion, scattering, polarization).*

Course Name: Waves and Optics

Course Code: BSCHPHSC402

Course Type: **Core(Theory & Practical)**	Course Details: **CC-9**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain linear superposition of several collinear and mutually perpendicular SHMs.*
2. *Grow understanding due to manifestations by the optical (light) waves (viz., interference, diffraction and polarisation) can be made.*
3. *Apply knowledge of sound waves, and light waves to explain natural physical processes and related technological advances.*

Course Name: Digital Systems and Applications

Course Code: BSCHPHSC 403

Course Type: **Core(Theory & Practical)**	Course Details: **CC-10**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Work with binary logic, and thus know how different kinds of logic gates work.*
2. *Develop a digital logic and apply it to solve real life problems.*
3. *Understand the difference between combinational and sequential logic circuits.*
4. *Analyze, design and implement combinational and sequential logic circuits.*
5. *Gain knowledge how modern day computer works.*

SKILL ENHANCEMENT COURSE

Course Name: Basic Instrumentation Skills

Course Code: BSCHPHSSEC401

Course Type: **SEC (Practical)**	Course Details: **SEC-2**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	…….	20	……

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Get exposure with various aspects of instruments and their usage through hands-on mode.*
2. *Do experiments listed below in continuation of the topics*

Course Name: Computational Physics

Course Code: BSCHPHSSEC402

Course Type: **SEC (Practical)**	Course Details: **SEC-2**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	…….	20	……

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Use computer programming language FORTRAN for solving the problems in physics through programming.*
2. *Prepare manuscript for scientific publication using Latex.*
3. *Visualize numerical data using Gnuplot software.*

Semester – V

Course Name: Quantum Mechanics

Course Code: BSCHPHSC501

Course Type: **Core (Theory & Practical)**	Course Details: **CC-11**			L-T-P: **4-0-4**	
Credit: **6**	FullMarks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Explain the failures of classical theory in explaining different experiments of early twentieth century are discussed.

2. Understand ideas of wave-particle duality, matter-wave.

3. Explain how the importance of Schrodinger equation (time-dependent and time-independent) to demonstrate solutions of some systems for different proto-type potentials (1d and 3d) .

4. Understand the concepts of quantum (Hermitian) operators and basis vectors.

Course Name: Thermal Physics II

Course Code: BSCHPHSSC502

Course Type: **Core(Theory)**	Course Details:**CC-12**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Demonstrate a mastery of the core knowledge in the areas of Thermal Physics.*
2. *Explain the concept of thermodynamic as an empirical description for the thermal properties of a macroscopic system.*
3. *Understand the* a*pplications of thermodynamics and the theory of the phase-transitions are discussed.*

Discipline Specific Elective (DSE I & II)

Course Name: Nuclear and Particle Physics

Course Code: BSCHPHSDSE501

Course Type: **DSEC(Theory)**	Course Details:**DSEC1&2**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain structure and properties of nuclei, the mechanism of different radioactive decays and their applications in peaceful use of nuclear energy.*
2. *Understand what are the elementary particles that constitute this known universe.*
3. *Gather capability of elementary problem solving in nuclear and particle physics.*

Course Name: Communication Electronics

Course Code: BSCHPHSDSE502

Course Type: **DSEC (Theory)**	Course Details:**DSEC1&2**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Get familiar with different types of communication systems used in electronics.*
2. *Understand information theory and coding techniques. They will get knowledge about principle of Radar, satellite and mobile communication system.*

Course Name: Atomic Physics & Spectroscopy

Course Code: BSCHPHSDSE503

Course Type: **DSEC(Theory)**	Course Details:**DSEC1&2**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand the concepts of atomic spectra and its origin using the old quantum theory whose consistency can be later verified by the direct application of the quantum mechanics.*
2. *Account for theoretical models, terminology & working methods used in atomic and molecular physics.*
3. *Carry out experimental and theoretical studies on atomic and molecular physics with focus on structure and dynamics of atoms and molecules.*

Course Name: Astronomy & Astrophysics

Course Code: BSCHPHSDSE504

Course Type: **DSEC(Theory)**	Course Details:**DSEC1&2**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Learn how to unravel the secrets of the Universe applying basic physical principles from a broad range of topics in physics to astronomical circumstances.*
2. *Understand the astrophysical processes and systems, ranging from our own sun to stars, galaxies and the whole universe.*
3. *Use proficiency in physics, mathematics, computer science, and statistics to get a broader understanding of the universe*

Semester -VI

Course Name: Statistical Mechanics

Course Code: BSCHPHSC601

Course Type: **Core(Theory)**	Course Details:**CC-13**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand how probability theory can be used to derive relations between the microscopic and macroscopic properties of matter.*
2. *Understand classical and quantum statistics and their application in different systems enable students to develop knowledge about how Bosonic and Fermionic systems behave.*
3. *Realize how electrons behave in metals and semiconductors, and photons in blackbody radiations or phonons in solids.*

Course Name: Condensed Matter Physics

Course Code: BSCHPHSC602

Course Type: **Core(Theory)**	Course Details:**CC-14**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand the lattice structure in crystalline solids and their different properties (viz., dielectric, magnetic, electrical transport).*
2. *Explain elementary idea on superconductivity.*

Discipline Specific Elective (DSE III & IV)

Course Name: Applied Optics

Course Code: BSCHPHSDSE601

Course Type: DSEC	Course Details: DSEC3&4			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand the geometrical / ray optics through transfer matrix-formalism*
2. *Acquire basic knowledge on different types ofoptical phenomena*
3. *Realize the technological applicationsof optical phenomena as a background of the fiber optics, holography, LASER and photo-detectors.*
4. *Analyze different laser systems and its applications in various fields.*
5. *Conceptualize optical fiber, its construction and importance in communication physics.*

Course Name: Physics of Devices and Instruments

Course Code: BSCHPHSDSE602

Course Type: **DSEC(Theory)**	Course Details:**DSEC3&4**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Get exposure with various aspects of instruments and their usage through hands-on mode.*
2. *Analyze the performance characteristics of different electronic devices.*
3. *Understand the concepts of Communication Systems effectively.*

Course Name: Classical Dynamics

Course Code: BSCHPHSDSE603

Course Type: **DSEC(Theory)**	Course Details:**DSEC3&4**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand how the formulation of the Lagrangian and Hamiltonian mechanics comes through the calculus of variation.*
2. *Get idea how small oscillations of isolated and coupled systems are studied through normal modes.*
3. *Understand how the formulation of (special) relativistic mechanics comes through four-vectors and Minkowski cone.*

Course Name: Nanomaterials and Applications

Course Code: BSCHPHSDSE604

Course Type: **DSEC (Theory)**	Course Details:**DSEC3&4**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		……	**10**	……	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Gain experience in applying unique properties of nanomaterials to solve problems and challenges in our life.*
2. *Demonstrate the ability to develop case studies of nanomaterials with a focus on fundamentals, fabrication, characterization, and applications.*
3. *Gather knowledge about synthesis, characterization and applications of nanomaterials.*
4. *Collect information about optical, electrical and mechanical properties of the nanomaterials.*

GENERIC ELECTIVE COURSES

Course Learning Outcomes

Semester-I

Course Name: Mechanics

Course Code: BSCHPHSGE101

Course Type: **Core (Theory& Practical)**	Course Details: **GE-I**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand vector calculus, classical mechanics of single as well as system of particles within the scope the Newtonian formulation.*
2. *Describe general properties of bulk matter and different types of simple harmonic linear oscillations.*
3. *Discuss classical mechanics of rotating systems and particle under central force.*
4. *Introduce Einstein's special theory of relativity and the classical mechanics of fast moving particles.*

Semester-II

Course Name: Electricity and Magnetism

Course Code: BSCHPHSGE201

Course Type: **Core (Theory & Practical))**	Course Details: **GE-II**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Explain the properties of (i) the electric field produced due to charges at rest; (ii) the magnetic field produced due to steady current, both in free-space and inside matter.*

2. *Describe the basic idea of electromagnetism, through Maxwell's equation, hence the generation of EM waves.*

Semester- III

Course Name: Fundamentals of Thermal and Statistical Physics

Course Code: BSCHPHSGE301

Course Type: **Core(Theory & Practical)**	Course Details: **GE-II**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Realize the kinetic theory of ideal classical gas.*
2. *Explain radiative process of heat transfer*
3. *Understand the laws of thermodynamics and their applications in simple system.*
4. *Introduce (i) classical (MB) and quantum (BE, FD) distributions as most-probable micro-canonical distributions; (ii) different thermodynamic quantities (viz., entropy, pressure, chemical potential etc.) (iii) black-body radiation and BE condensation.*

Semester-IV

Course Name: Fundamentals of Waves and Optics

Course Code: BSCHPHSGE401

Course Type: **Core (Theory & Practical)**	Course Details: **GE-IV**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Find the resultant of two collinear and mutually perpendicular SHMs and, explain progressive elastic wave.*
2. *Understand the manifestations of optical wave (viz., interference, diffraction and polarisation).*

BSC PROGRAM IN PHYSICS

COURSE LEARNING OUTCOMES

Semester – I

Course Name: Mechanics

Course Code: BSCPPHSC101

Course Type: **Core (Theory& Practical)**	Course Details: **CC-1(1)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	**20**	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand vector calculus, classical mechanics of single as well as system of particles within the scope Newtonian formulation.*
2. *Describe general properties of bulk matter and different types of simple harmonic linear oscillations.*
3. *Discuss classical mechanics of rotating systems and particle under central force.*
4. *Introduce Einstein's special theory of relativity and the classical mechanics of fast moving particles.*

Semester – II

Course Name: Electricity and Magnetism

Course Code: BSCPPHSC201

Course Type: **Core (Theory & Practical))**	Course Details: **CC-1(2)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Explain the properties of (i) the electric field produced due to charges at rest; (ii) the magnetic field produced due to steady current, both in free-space and inside matter.

2. Describe the basic idea of electromagnetism, through Maxwell's equation, hence the

generation of EM waves.

3. Describes on the electrical circuits and bridges in presence of AC current.

Semester - III

Course Name: Basics of Thermal and Statistical Physics

Course Code: BSCPPHSC301

Course Type: **Core(Theory & Practical)**	Course Details: **CC-1(3)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Realize the kinetic theory of ideal classical gas.*
2. *Explain radiative process of heat transfer*
3. *Understand the laws of thermodynamics and their applications in simple system.*
4. *Introduce (i) classical (MB) and quantum (BE, FD) distributions as most-probable micro-canonical distributions; (ii) different thermodynamic quantities (viz., entropy, pressure, chemical potential etc.) (iii) black-body radiation and BE condensation.*

SKILL ENHANCEMENT COURSE

Course Name: Electrical Circuit Network Skills

Course Code: BSCPPHSSEC301

Course Type: **SEC (Practical)**	Course Details: **SEC-1**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Design and trouble shoots the electrical circuits, networks and appliances through hands-on mode.*
2. *Analyze any given electrical network.*
3. *Synthesize an electrical network from a given impedance/admittance function.*

Semester - IV

Course Name: Basics of Waves and Optics

Course Code: BSCPPHSC401

Course Type: **Core (Theory & Practical)**	Course Details: **CC-1(4)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Find the resultant of two collinear and mutually perpendicular SHMs and, explain progressive elastic wave.*
2. *Understand the manifestations of optical wave (viz., interference, diffraction and polarisation).*

SKILL ENHANCEMENT COURSE

Course Name: Basic Instrumentation Skills

Course Code: BSCPPHSSEC401

Course Type: **SEC (Practical)**	Course Details: **SEC-II**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Get exposure with various aspects of instruments and their usage through hands-on mode.*
2. *Do experiments listed below in continuation of the topics.*

Semester-V

DISCIPLINE SPECIFIC ELECTIVE (DSE)

Course Name: Modern Physics

Course Code: BSCPPHSDSE501

Course Type: D**SE-I (Theory)**	Course Details: **DSEC-1(1)**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		…..	**10**	…..	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand the root in the development of modern physics*
2. *Understand the relationship between the real and reciprocal space and learn the Bragg's X-ray diffraction in crystals*
3. *Gain a hands-on learning experience by performing experiments on these properties of materials.*
4. *Describe the behavior of matter and energy at atomic and subatomic level*

Course Name: Astronomy & Astrophysics

Course Code: BSCPPHSDSE502

Course Type: D**SE-I(Theory)**	Course Details: **DSEC-1(1)**			L-T-P: **5-1-0**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		…..	**10**	…..	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

4. *Learn how to unravel the secrets of the Universe applying basic physical principles from a broad range of topics in physics to astronomical circumstances.*
5. *Understand the astrophysical processes and systems, ranging from our own sun to stars, galaxies and the whole universe.*
6. *Use proficiency in physics, mathematics, computer science, and statistics to get a broader understanding of the universe.*

Course Name: Technical Drawing Skills

Course Code: BSCPPHSSEC501

Course Type: **SEC (Practical)**	Course Details: **SEC-III**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

7. *Know and understand the conventions and the method of engineering drawing.*
8. *Interpret engineering drawings using fundamental technical mathematics.*
9. *Construct basic and intermediate geometry.*
10. *Improve their visualization skills so that they can apply the skill in developing new products.*
11. *Improve their technical communication skill in the form of communicative drawings.*
12. *Comprehend the theory of projection.*

Semester-VI

Course Name: Basic Electronics

Course Code: BSCPPHSDSE601

Course Type: D**SE-II(Theory & Practical)**	Course Details: **DSEC-1(2)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. *Understand both in analog and digital electronics.*
2. *Design several electronic devices thorough the knowledge on electronic circuit, semiconductor and its properties.*

Course Name: Nanomaterials and Applications

Course Code: BSCPPHSDSE602

Course Type: **DSEII (Theory & Practical)**	Course Details: **DSEC-1(2)**			L-T-P: **4-0-4**	
Credit: **6**	Full Marks: **100**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**10**	20	**40**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

5. *Gain experience in applying unique properties of nanomaterials to solve problems and challenges in our life.*
6. *Develop case studies of nanomaterials with a focus on fundamentals, fabrication, characterization, and applications.*
7. *Gather knowledge about synthesis, characterization and applications of nanomaterials.*
8. *Collect knowledge about optical, electrical and mechanical properties of the nanomaterials.*

SKILL ENHANCEMENT COURSE

Course Name: Computational Physics

Course Code: BSCPPHSSEC601

Course Type: **SEC(Practical)**	Course Details: **SEC-IV**			L-T-P: **0-0-8**	
Credit: **4**	Full Marks: **50**	CA Marks		ESE Marks	
		Practical	Theoretical	Practical	Theoretical
		30	**…….**	20	**……**

Course Learning Outcomes:

After the completion of course, the students will have ability to:

1. Use computer programming language FORTRAN for solving the problems in physics through

programming.

2. Prepare manuscript for scientific publication using Latex.

3. Visualize numerical data using Gnuplot software.