

**ST. JOSEPH'S COLLEGE, DEVAGIRI, CALICUT
(AUTONOMOUS)**



UNDER GRADUATE DEGREE PROGRAMME

**ST. JOSEPH'S CHOICE BASED CREDIT SEMESTER SYSTEM
(SJCBCSSUG)**

**BACHELOR OF SCIENCE IN
B.Sc. PHYSICS
(CORE, OPEN & COMPLEMENTARY COURSES)**

Course Outcome
(2019Admn Onwards)

COURSE OUTCOMES – CORE COURSES

SEMESTER I

GPHY1B01T – METHODOLOGY OF SCIENCE AND BASIC MECHANICS

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 36 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the features, methods and limitations of science
CO2	Understand and apply the basic concepts of Newtonian Mechanics to physical systems
CO3	Understand and apply the basic idea of work-energy theorem to physical systems
CO4	Understand and apply the rotational dynamics of rigid bodies
CO5	Understand the basic ideas of elasticity

SEMESTER II

GPHY2B02T – MECHANICS

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 36 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the features of non-inertial systems and fictitious forces
CO2	Understand and analyse the features of central forces with respect to planetary motion.
CO3	Understand the basics ideas of harmonic oscillations
CO4	Understand and analyse the basics concepts of wave motion

SEMESTER III
GPHY3B03T – ELECTRODYNAMICS - I

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand and apply the fundamentals of vector calculus
CO2	Understand and analyse the electrostatic properties of physical system
CO3	Understand the mechanism of electric field in matter.
CO4	Understand and analyse the magnetic properties of physical systems
CO5	Understand the mechanism of magnetic field in matter.

SEMESTER IV
GPHY4B04T – ELECTRODYNAMICS - II

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic concepts of electrodynamics
CO2	Understand and analyse the properties of electromagnetic waves
CO3	Understand the behaviour of transient currents
CO4	Understand the basic aspects of ac circuits
CO5	Understand and apply electrical network theorems

SEMESTER I TO VI
GPHY4B05P – PHYSICS CORE PRACTICAL I

Contact Hours per Week: 2 hours in each semester

Number of Credits: 5

Number of Contact Hours: 36 hours in each semester

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics through experiments
CO4	Apply and illustrate the principles of electronics through experiments

SEMESTER V
GPHY5B06T – COMPUTATIONAL PHYSICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the Basics of Python programming.
CO2	Understand the applications of Python modules
CO3	Understand the basic techniques of numerical analysis
CO4	Understand and apply computational techniques to physical problems

SEMESTER V
GPHY5B07T – QUANTUM MECHANICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the particle properties of electromagnetic radiation
CO2	Describe Rutherford – Bohr model of the atom
CO3	Understand the wavelike properties of particles
CO4	Understand and apply the Schrödinger equation to simple physical systems
CO5	Apply the principles of wave mechanics to the Hydrogen atom

SEMESTER V
GPHY5B08T – OPTICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the fundamentals of Fermat's principles and geometrical optics
CO2	Understand and apply the basic ideas of interference of light
CO3	Understand and apply the basic ideas of diffraction of light
CO4	Understand the basics ideas of polarization of light
CO5	Describe the basic principles of holography and fibre optics

SEMESTER V
GPHY5B09T – ELECTRONICS (ANALOG & DIGITAL)

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic principles of rectifiers and dc power supplies
CO2	Understand the principles of transistor
CO3	Understand the working and designing of transistor amplifiers and oscillators
CO4	Understand the basic operation of Op –Amp and its applications
CO5	Understand the basics of digital electronics

SEMESTER VI
GPHY6B10T – THERMODYNAMICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the zero and first laws of thermodynamics
CO2	Understand the thermodynamics description of the ideal gas
CO3	Understand the second law of thermodynamics and its applications
CO4	Understand the basic ideas of entropy
CO5	Understand the concepts of thermodynamic potentials and phase transitions

SEMESTER VI
**GPHY6B11T – STATISTICAL PHYSICS, SOLID STATE
PHYSICS, SPECTROSCOPY & PHOTONICS**

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic principles of statistical physics and its applications
CO2	Understand the basic aspects of crystallography in solid state physics
CO3	Understand the basic elements of spectroscopy
CO4	Understand the basics ideas of microwave and infra-red spectroscopy
CO5	Understand the fundamental ideas of photonics

SEMESTER VI
**GPHY6B12T – NUCLEAR PHYSICS AND PARTICLE
PHYSICS**

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic aspects of nuclear structure and fundamentals of radioactivity
CO2	Describe the different types of nuclear reactions and their applications
CO3	Understand the principle and working of particle detectors
CO4	Describe the principle and working of particle accelerators
CO5	Understand the basic principles of elementary particle physics

SEMESTER VI
**GPHY6B13T – RELATIVISTIC MECHANICS AND
ASTROPHYSICS**

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the fundamental ideas of special relativity
CO2	Understand the basic concepts of general relativity and cosmology
CO3	Understand the basic techniques used in astronomy
CO4	Describe the evolution and death of stars
CO5	Describe the structure and classification of galaxies

ELECTIVE
SEMESTER VI
GPHY6E01T –BIOMEDICAL PHYSICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic principles of biophysics.
CO2	Understand the fundamentals of medical instrumentation
CO3	Understand the principles of ultrasound and x-ray imaging
CO4	Understand the basic principles of NMR
CO5	Describe the applications of lasers in medicine

ELECTIVE
SEMESTER VI
GPHY6E02T –NANOSCIENCE AND TECHNOLOGY

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the elementary concepts of nanoscience
CO2	Understand the electrical transport mechanisms in nanostructures
CO3	Understand the applications of quantum mechanics in nanoscience
CO4	Understand the fabrication and characterization techniques of nanomaterials
CO5	Enumerate the different applications of nanotechnology

ELECTIVE
SEMESTER VI
GPHY6E03T –MATERIALS SCIENCE

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic ideas of bonding in materials
CO2	Describe crystalline and non-crystalline materials
CO3	Understand the types of imperfections and diffusion mechanisms in solids
CO4	Describe the different properties of ceramics and polymers
CO5	Describe the different types of material analysis techniques

SEMESTER V & VI
GPHY6B14P – PHYSICS CORE PRACTICAL II

Contact Hours per Week: 4 hours in each semester

Number of Credits: 5

Number of Contact Hours: 72 hours in each semester

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics and spectroscopy through experiments
CO4	Apply and illustrate the principles of heat through experiments

SEMESTER V & VI
GPHY6B15P – PHYSICS CORE PRACTICAL III

Contact Hours per Week: 4 hours in each semester

Number of Credits: 5

Number of Contact Hours: 72 hours in each semester

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Apply and illustrate the principles of semiconductor diode and transistor through experiments.
CO2	Apply and illustrate the principles of transistor amplifier and oscillator through experiments
CO3	Apply and illustrate the principles of digital electronics through experiments
CO4	Analyse and apply computational techniques in Python programming

SEMESTER V & VI
GPHY6B16D – PROJECT & TOUR REPORT

Contact Hours per Week: 2 hours in each semester

Number of Credits: 2

Number of Contact Hours: 36 hours in each semester

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand research methodology
CO2	Understand and formulate a research project
CO3	Design and implement a research project
CO4	Identify and enumerate the scope and limitations of a research project

COURSE OUTCOMES – COMPLIMENTARY COURSES

SEMESTER I

GPHY1C01T – PROPERTIES OF MATTER & THERMODYNAMICS

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 36 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic principles of elasticity
CO2	Understand the concepts of surface tension
CO3	Understand the aspects of viscosity
CO4	Understand the basic principles of thermodynamics

SEMESTER II

GPHY2C02T – OPTICS, LASER & ELECTRONICS

Contact Hours per Week: 2

Number of Credits: 2

Number of Contact Hours: 36 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic concepts of interference and diffraction
CO2	Understand the concepts of polarization
CO3	Understand the fundamentals of electronics
CO4	Understand the important principles of laser physics

SEMESTER III
**GPHY3C03T – MECHANICS, RELATIVITY, WAVES
AND OSCILLATIONS**

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic ideas of frames of reference and the principles of conservation of energy and momentum
CO2	Understand the concepts of relativity
CO3	Understand the basic ideas of oscillations and waves
CO4	Understand the basic ideas of modern physics.

SEMESTER IV
**GPHY4C04T – ELECTRICITY, MAGNETISM AND
NUCLEAR PHYSICS**

Contact Hours per Week: 3

Number of Credits: 2

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic ideas of static and current electricity
CO2	Understand the concepts of magnetism
CO3	Describe the fundamental concepts of nuclear physics
CO4	Understand the basic ideas of cosmic rays and elementary particles

SEMESTER I TO IV
GPHY4C05P – COMPLEMENTARY PHYSICS
PRACTICAL

Contact Hours per Week: 2 hours in each semester

Number of Credits: 4

Number of Contact Hours: 36 hours in each semester

Course Evaluation: 100 (Internal 20& External 80)

COs	COURSE OUTCOMES
CO1	Apply and illustrate the concepts of properties of matter through experiments
CO2	Apply and illustrate the concepts of electricity and magnetism through experiments
CO3	Apply and illustrate the concepts of optics through experiments
CO4	Apply and illustrate the principles of electronics through experiments

COURSE OUTCOMES – OPEN COURSES

SEMESTER V

GPHY5D01T – NON CONVENTIONAL ENERGY SOURCES

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the importance of non-conventional energy sources
CO2	Understand basic aspects of solar energy
CO3	Understand basic principles of wind energy conversion
CO4	Understand the basic ideas of geothermal and biomass energy and recognize their merits and demerits
CO5	Understand the basic ideas of oceans and chemical energy resources and recognize their merits and demerits

SEMESTER V

GPHY5D02T – AMATEUR ASTRONOMY AND ASTROPHYSICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Describe the history and nature of astronomy as a science
CO2	Understand the motion of earth in space and the cause of seasons
CO3	Understand the basic elements of solar system
CO4	Understand the elementary concepts of solar system

SEMESTER V
GPHY5D03T – ELEMENTARY MEDICAL PHYSICS

Contact Hours per Week: 3

Number of Credits: 3

Number of Contact Hours: 54 Hrs

Course Evaluation: 75 (Internal 15 & External 60)

COs	COURSE OUTCOMES
CO1	Understand the basic aspects of physics of nuclear medicine.
CO2	Recognize different bioelectric signals and their instrumentation
CO3	Understand the basic elements of X-ray imaging
CO4	Understand the basic elements of ultrasound imaging and its advantages and disadvantages