


## Detailed Syllabus of Open Elective Courses in Physics for Second Year UG Programmes

### PHYOEC21:

<b>Course Title</b>	<b>Physics around us</b>
<b>Course code</b>	<b>PHYOEC21</b>
<b>Course credits</b>	<b>3</b>
<b>Total Contact Hours</b>	<b>39</b>
<b>Formative Assessment Marks</b>	<b>30</b>
<b>Summative Assessment Marks</b>	<b>70</b>
<b>Model Syllabus Authors</b>	<b>BoS, Tumkur University</b>

Chapter Number	Topics to be covered	Contact hours
<b>Unit - 1</b>		
Chapter-1	<p><b>System of units:</b> FPS, CGS, MKS and SI. Basic definitions and interconversion among them.</p> <p><b>Dimensions:</b> Dimensional formula of physical quantities. Dimension analysis and its applications.</p> <p><b>Measurement:</b> Measured value and absolute value; Error in measurement, Types of errors.</p> <p><b>Significant figures:</b> Significant figures and rounding off of values, prefixes.</p> <p>Problems on conversion among system of units.</p>	13
Chapter-2	<p><b>Kinematics:</b> Translational and rotational motion; displacement, velocity and acceleration in both translational and rotational motion; Relation among them; Equations of motion for both translational and rotational motion; Applications of equations of motion. Problems</p> <p><b>Mechanics:</b> Force and equilibrium; moment of force; working principle of lever and simple mechanical instruments; Newton's laws of motion and its applications. Conservation laws- momentum (linear and angular) and energy. Problems</p>	
<b>Topics for self-study</b>		
	Concept of inertia and moment of inertia; Centre of mass.	

<b>Suggested Activities for students</b>		
Activity-1	Ask the students to know about different units used to measure various physical quantity in their day to day activities and convert them to SI units.	-
Activity-2	Encourage the students to carry out error analysis and calculate the error in the result due to error in their measurements.	-
Activity-3	Ask the students to demonstrate conservation of linear and angular momentum using their own simple experiments.	
<b>Unit - 2</b>		
Chapter-3	<b>Sound:</b> Longitudinal nature of sound; Production and detection of sound; Audible frequency range, infrasonic and ultrasonic sounds; Velocity of sound – Newton’s formula and correction; Variation of velocity of sound with respect to temperature and humidity. Velocity of sound in media under motion. Intensity and loudness of sound; Noise and music; Doppler effect (with derivation). Principle of microphones and loudspeakers. Problems	13
Chapter-4	<b>Light:</b> Wavelength and frequency range of visible light. Laws of reflection and refraction; Total internal reflection; Dispersion of light – Splitting of white light using prism, Formation of rainbow; Color temperature of light and their effect on eyes. Different types of bulbs, their efficiency, effect on eyes, advantages and disadvantages (Incandescent, Fluorescent and LED bulbs). Problems.	
<b>Topics for self-study</b>		
	Frequency of seven musical notes; Fundamental and harmonics;  Normal shift and lateral shift.	
<b>Suggested Activities for students</b>		
Activity-4	Ask the students to experience how different frequency sounds feel like. Ask them to quantify and express the variation.	
Activity-5	Students can demonstrate the reflection, refraction, total internal reflection and diffraction using simple objects like a glass slab or water.	
<b>Unit - 3</b>		
Chapter-5	<b>Heat and temperature:</b> Heat supplied and internal energy of a system. Concept of temperature; Thermal equilibrium; Heat transfer through solids, liquids and gases; Good and bad conductors; Newton’s law of	13

	cooling; First law of thermodynamics and its applications. Heat capacities of solids, liquids and gases. Problems.	
Chapter-6	<b>Astrophysics:</b> Solar system – Sun, planets, asteroids, comets, meteoroids etc; Identifying some planets and stars with naked eye; Kepler’s laws of planetary motion; Life cycle of stars. Milky way and other galaxies; Space telescopes; Notable achievements of ISRO-Aryabhata, PSLV, GSLV, Chandrayaan and Mangalyaan.	
<b>Suggested Activities for students</b>		
Activity-6	Simple experiments like cooling a cup of water and observing how temperature decreases with time can be performed to demonstrate the Newton’s law of cooling.	
Activity-7	Time taken/ Heat required to rise the temperature of different liquids can be measured and they can be arranged in order of their heat capacities.	
Activity-8	Ask the students to observe the night sky and identify various stars and planets. An android app “Stellarium” can be used in this regard.	

### Reference books

Sl. No.	Title of the book	Authors name	Publisher	Year of publication
1	Physics Vol-I	Halliday and Resnick	John Wiley & sons	2013
2.	Physics through experiments	B. Saraf	Vikas Publications	2013
3	The Physics Behind: Discover the Physics of Everyday Life	Russ Swan	Firefly books	2018
4	Physics in Daily Life	Nibu A George	Lilly Publishing House	2019
5	Berkeley Physics Course – Waves	Frank S Crawford	Tata Mc Graw Hill	2011
6	Fundamentals of Optics	Francis Jenkins and Harvey White	McGraw Hill Edu	2017
7	Thermodynamics	Enrico Fermi	Snowball Publishing	2010

**PHYOEC22:**


<b>Course Title</b>	<b>Basics of Electricity and Magnetism</b>
<b>Course code</b>	<b>PHYOEC22</b>
<b>Course credits</b>	<b>3</b>
<b>Total Contact Hours</b>	<b>39</b>
<b>Formative Assessment Marks</b>	<b>30</b>
<b>Summative Assessment Marks</b>	<b>70</b>
<b>Model Syllabus Authors</b>	<b>BoS, Tumkur University</b>

<b>Chapter Number</b>	<b>Topics to be covered</b>	<b>Contact hours</b>
<b>Unit - 1</b>		
Chapter-1	Electrostatics: Static charges; method of charging; Coulomb's law; Concept of electric field and electric intensity; Electric field due to a point charge and distribution of charges; Electric discharge; Formation of lightning and thunder bolt;  Magnetism: Magnetic interactions; Types of magnets – Permanent and electromagnet; Magnetic field intensity, magnetization; Force on current carrying conductor in magnetic field; Working of a simple DC and AC motors;	13
<b>Topics for self-study</b>		
	Electric and magnetic lines of force and flux.	-
<b>Suggested Activities for students</b>		
Activity-1	Ask the students to charge some objects and do some experiments with them.	-
Activity-2	Ask the students to plot magnetic lines of force for different types of magnets/electromagnets.	-
<b>Unit - 2</b>		
Chapter-4	<b>Physics of alternating current:</b> Alternating and Direct current; current, voltage, power and phase; Phase, neutral and ground in electrical connections; A model domestic wiring; Calculation of load and determining the quality of wire; Single phase and three phase currents; Working of MCB, ELCB and Relays; Safety precautions and rules in handling electrical appliances; Importance of grounding. Problems	13

<b>Topics for self-study</b>		
	Electric power generators; Electric projects in Karnataka; Physics of solar cells.	
<b>Suggested Activities for students</b>		
Activity-3	Students can prepare a chart to demonstrate the electrical wiring of a simple house.	
Activity-4	Ask the students to visit an electrical shop and learn the application, advantageous and disadvantageous of various electrical components.	
<b>Unit - 3</b>		
Chapter-3	Storing of electric energy: Batteries and their types; Charging and discharging of batteries; Construction and working of Lithium-ion batteries; Advantages and disadvantages of Lithium-ion batteries.  Capacitors: Construction and working of a parallel plate capacitor, Charge stored and energy stored in a capacitor; Leakage current and corresponding energy loss; Application of capacitors in storing of energy; An introduction to super capacitors	13
<b>Suggested Activities for students</b>		
Activity-5	Ask the students to prepare a chart on different types of batteries and their evolution over time.	-
Activity-6	Students can demonstrate how capacitor gets charged and discharged using a capacitor, resistor and a bulb.	-

### Reference books

Sl. No.	Title of the book	Authors name	Publisher	Year of publication
1	Physics-Part-II,	David Halliday and Robert Resnick	Wiley Eastern Limited	2001
2.	Modern Electronic Instrumentation and Measurement Techniques	A D Helfrick and W D Cooper	PHI	2016
3	Electronic Devices and Circuits	David A Bell	PHI	2004

  
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