Lok Jagruti Kendra University

University with a Difference

Diploma in Electronics & Communication Engineering

LJ Polytechnic

Course Code: 025030103

Engineering Physics

Programme / Branch Name			Diploma in Electronics & Communication Engineering			
Course Name	Engineering Physics				**Course Code**	025030103
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	2	4	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Engineering physics majors are expected to have a basic understanding of calculus and physics.

3. Rationale

Physics is a fundamental science that endeavors to explain all the natural phenomena that occur in the universe. As physics is considered as basic science its principles, laws, hypothesis, concepts, ideas are playing important role in reinforcing the knowledge of technology. Physics uses qualitative and quantitative models and theories based on physical laws to visualize, explain and predict physical phenomena. Models, laws and theories are developed from, and their predictions are tested by making, observations and quantitative measurements. Physics has helped to unlock the mysteries of the universe and provides the foundation of understanding upon which modern technologies and all other sciences are based.

4. Objectives

- ✓ Engineering physics includes the study of a large number of diverse topics all related to materials/things that exist in the world around us.
- ✓ It aims to give an understanding of this world both by observation and by prediction of the way in which such objects behave.
- ✓ Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.
- ✓ The course will help the diploma engineers to apply the basic concepts and principles to solve broad based engineering problems and to understand different technology based applications.

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcome	% Weightage	Hours
1.	**Physical World, Units and Measurements**	1.1. Need of measurement and unit in engineering and science 1.2. Definition of unit 1.3. Requirements of standard unit, systems of units- CGS, MKS and SI 1.4. Fundamental and derived quantities and their units 1.5. Least count and range of instrument 1.6. Least count of vernier caliper and micrometer screw gauge 1.7. Need of measuring instruments 1.8. Types of measurement (direct, indirect) 1.9. Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures	• Identify physical quantities and select their units to use in engineering solutions. • Distinguish physical quantities as scalar and vectors and solve real life relevant problems. • Describe various system of measurements. • Take measurements with accuracy by minimizing different types of errors. • Measure the various dimension of a tiny object using vernier caliper and micrometer screw gauge.	20	09
2.	**Basic Electronics**	2.1. Electric current and its units 2.2. Direct and alternating current 2.3. Resistance and its units 2.4. Specific resistance and conductance 2.5. Series and parallel combination of resistances 2.6. Factors affecting resistance of a wire 2.7. Carbon resistances and colour coding	• Analyze and measure parameters in basic electronics circuits. • Differentiate between series and parallel combination of resistance. • Describe the factors affecting resistance of a wire. • Measure of the electric current, potential difference, resistance etc. • List out the effects of an electric current and its common applications.	20	08
3.	**Current Electricity**	3.1. Ohm's law and its verification 3.2. Kirchhoff's laws	• List out the effects of an electric current and its common applications.	20	09

		3.3. Wheatstone bridge and its applications (slide wire bridge only) 3.4. Concept of terminal potential difference and electro motive force (EMF) 3.5. Heating effect of current 3.6. Electric power 3.7. Electric energy and its units (related numerical problems) 3.8. Advantages of electric energy over other forms of energy	• Understand the measurement of resistance, voltage and current. • Identify the value of unknown resistance. • Demonstrate working and application of Kirchhoff's law. • Verify cells in series, parallel and series-parallel • The energy consumed by an appliances.		
4.	**Semiconductor Physics**	4.1. Energy bands in solids 4.2. Types of materials (insulator, semi-conductor, conductor) 4.3. Intrinsic and extrinsic semiconductors 4.4. P-N junction 4.5. Junction diode and V- I characteristics 4.6. Types of junction diodes 4.7. Diode as rectifier – half wave and full wave rectifier (centre taped) and bridge rectifier 4.8. Transistor; description and three terminals 4.9. Types- PNP and NPN 4.10. Different types of cells: photocells, solar cells; working principle and engineering applications	• Knowledge of diodes in rectifiers, power adapters and various electronic circuits. • Demonstrate semiconductors in various technical gadgets like mobile phones, computers, LED, photocells, solar lights etc.	20	08
5.	**Modern Physics**	5.1. Nanoscience and nanotechnology: introduction 5.2. Nanoparticles and nanomaterials 5.3. Properties at nanoscale 5.4. Nanotechnology based devices and applications 5.5. Types of lasers; Ruby, He-Ne and semiconductor 5.6. Applications of LASER 5.7. Integrated circuit logic families	• Explain importance of nanoscience and nanotechnology. • Illustrate the conditions for light amplification in various LASER , laser based instruments and optical devices. • Aware of the importance of integrated circuit.	20	08
				Total Hours	**42**

6. List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note: However, if these practical/exercises are completed appropriately, they would also lead to the development of certain outcomes in an affective domain which would, in turn, lead to the development of course outcomes related to the affective domain. Thus, the overall development of programme outcomes (as given in a common list at the beginning of the curriculum document for this programme) would be assured. Faculty should refer to that common list and should ensure that students also acquire outcomes in an affective domain which are required for the overall achievement of programme outcomes/course outcomes.

Sr. No	Practicals / Exercises	Key Competency	Hours
1.	To measure length, radius of a given cylinder and rod using a vernier caliper	Use of the vernier calipers	2
2.	To determine the diameter of a given wire using a screw gauge	Use of the screw gauge.	2
3.	To verify Ohm's law by plotting graph between current and potential difference	Ohm's law	2
4.	To verify law of resistances in series combination	Equivalent resistance of the resistance connected in series	2
5.	To verify law of resistances in parallel combination	Equivalent resistance of the resistance connected in parallel	2
6.	To determine specific resistance of material using meter bridge	Concept of meter bridge	2
7.	To verify kirchhoff's law using electric circuits	Kirchhoff's law	2
8.	To compare the emf of two given primary cell using potentiometer	Application of Potentiometer	2
9.	To draw the i-v characteristic curve for a p-n junction diode in forward bias and reverse bias	Forward bias and reverse bias of a p-n junction	2
10.	To calculate sa/v ratio of simple objects to understand nanotechnology	Basics of Nanotechnology	2
		Total Hours	**20**

7. Suggested Specification Table with Hours

Unit No.	Chapter Name	Teaching Hours	Distribution of Topics According to Bloom's Taxonomy					
			R %	U %	App %	C %	E %	An %
1.	Physical world, Units and Measurements	09	30	25	25	10	05	05
2.	Basic Electronics	08	30	25	25	10	05	05
3.	Current Electricity	09	30	25	25	10	05	05
4.	Semiconductor Physics	08	30	25	25	10	05	05
5.	Modern Physics	08	30	25	25	10	05	05

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbooks

1) Concepts in Physics by H C Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

9. Reference Books

1) Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
2) Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
3) Modern approach to Applied Physics-I and II, A S Vasudeva, Modern Publishers
4) Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi
5) Engineering Physics by D K Bhhatacharya & PoonamTandan; Oxford University Press, New Delhi.

10. Open Sources (Website, Video, Movie)

1) https://www.youtube.com/playlist?list=PLSQj2zZx2Kxc-Cep3Esknmi42NfgpvmCN