Programme : Diploma in CO/IT	
Course Code: SC 23103	**Course Title: APPLIED PHYSICS**
Compulsory / Optional: Compulsory	

Teaching Scheme and Credits						Examination Scheme						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (3 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
3	-	2	1	6	3	30	70	25	25#	-	25	175

Total IKS Hrs. for course: 2hrs.

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:
1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.
2. SA-TH represents the end term examination.
3. FA-PR represents the term work
4. SA-PR represents the end term practical examination.

I.Rationale:

The subject is included under the category of science. The special feature of the subject is to develop the laboratory skill using principles of scientific phenomenon. This course will serve to satisfy the need of the technical students for their development in technical field. The course is designed by selecting thetopics which will develop intellectual skills of the students and will guide students to solve broad based engineering problems. Ultimately the focus of the course is to develop psychomotor skills in the students.

II. Industry / Employer Expected Outcome

Physics is a fundamental science that plays a crucial role in various industries and has numerous outcomes that benefit society: Apply principles of physics to solve broad based relevant engineering problems.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning.

CO1	State the different physical quantities, identify the proper unit of it and to estimate error in themeasurement of physical quantities.
CO2	Apply laws of motion in various engineering applications.
CO3	Analyze the concept of electric field in Engineering technology.
CO4	Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances.
CO5	Identify properties and application of light in Engineering field.

IV. Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's)aligned to CO's	Topics / Sub-topics
1	**TLO 1a.** Explain physical quantities and its types with examples. **TLO 1b.** Differentiate between scalar and vector quantities with examples. **TLO 1c**. Apply dimensional analysis to check correctness of equation and conversion of units in different systems. **TLO 1d.** Estimate the errors in the measurement for the give problem. **TLO 1e.** Explain the working of ancient astronomical instruments to measure distance, time and hour angle	**Units and Measurements** 1.1 Fundamental Physical quantities, examples. 1.2 Derived physical quantities, examples. 1.3 Scalar and Vector Physical Quantities. 1.4 Definition and requirements of unit 1.5 System of units, C. G. S., M. K. S. and S. I. units. 1.6 Dimensions, dimensional formula 1.7 `Rules to write the unit and conventions of units and Significant figures, rules to write significant figures 1.8 Error – Definition, types of errors and estimation of errors. 1.9 Ancient astronomical instruments: Chakra, Dhanyata , Yasti and Phalak yantra,Numerical **Course Outcome: CO1** **Teaching Hours :5 hrs.** **Marks: 10**
2	**TLO2a.** Differentiate between velocity and speed. Identify changes in motion that produce acceleration. Able to calculate speed, velocity and acceleration of an object, analytically, Classify acceleration as positive, negative, and zero. **TLO2b.** Identify different periodic motion with examples such as oscillatory motion, Vibratory motion, circular motion. **TLO2c**. Explain angular motion with equation of angular motion, explain relation between linear velocity and angular Velocity, understand the concept of centripetal and centrifugal force **TLO2d.** Describe real-life situations that illustrate each of	**Motions** 2.1 **Linear motion** –Definition – distance, displacement, velocity, acceleration, retardation, equation of motions, acceleration due to gravity and equation motion under gravity, numerical 2.2 **Periodic motions:** a) Oscillatory motion, b) Vibratory motion, c) S.H.M. d) Circular motion. (only definition and examples) , terms related to S.H.M. : Definition: Time period,frequency, amplitude, wavelength, and phase 2.3 **Angular motion:** a) Definition: angular motion, Uniform circular motion, Radius vector,linear velocity, Angular velocity, Angular acceleration, b) Relation between linear velocity and angular

	Newton's laws of motion. **TLO2e.** Explain the ancient theory of gravitation and laws of motion.	Velocity(derivation), Radial or centripetal acceleration, Three equations of motion (no derivations), Centripetal and Centrifugal force,examples and applications. 2.4. Laws of Motion and it's applications. 2.5. Ancient theory of Gravitation and laws of motion, Numerical. **Course Outcome: CO2** **Teaching Hours :12hrs** **Marks: 16**
3	**TLO3a**.Explain the concept of charge, electric field, potential and potential difference, absolute electric potential **TLO3b.** Calculate force between two charges using Coulomb's law. **TLO3C**. Illustrate different properties of lines of force **TLO3d.** Determine electric intensity, potential due a Charge. **TLO 3e.** Explain the relation between electric flux and electric flux density	**Electrostatics** 3.1 Definition of charge 3.2 Coulomb's law, Definition of electric field, 3.3Definition and unit of electric field intensity(E)(Derivation) 3.4 Definition and properties of electric lines of force 3.5 Definition of electric flux and electric flux density 3.6 Electric Potential (Derivation) 3.7 Definition & Explanation of Electric Potential 3.8 Definition & Explanation of absolute Electric Potential, Numerical. **Course Outcome: CO3** **Teaching Hours :6hrs** **Marks: 12**
4	**TLO 4**a. Explain electric field, potential and potential difference, Ohm's law **TLO 4b.** Explain resistance, Specific resistance **TLO 4c.** Apply laws of series and parallel combination to the given electrical circuits. **TLO4d. Ob**tain the balancing condition of Wheatstone's network **TLO 4e.** Explain the Magnetic effect of current, magnetic induction. **TLO 4f.** Apply Fleming left hand rule, Fleming right hand rule	**4 Electricity and Electromagnetism** 4.1.1 Ohm's Law, Statement and mathematical expression 4.2 Resistance &unit of its, Specific resistance, unit of specific resistance. 4.3 Resistance in series and parallel combination, shunt Resistance 4.4 Wheatstone network, balancing condition for it **4.2 Electromagnetism** 4.2.1 Magnetic effect of current, magnetic induction 4.2.2Properties of magnetic lines of force, 4.2.3Laplace's law, Fleming left hand rule, Fleming right hand rule, Numerical **Course Outcome: CO4** **Teaching Hours :14hrs** **Marks: 18**

| 5 | **TLO 5a.** Explain refraction and reflection of light.
TLO 5b. Explain refraction of lit through prism.
TLO 5c. Estimate refractive index of material of prism.
TLO 5d. Derive Prism Formula.
TLO 5e. Explain the phenomenon of total internal reflection.
TLO 5f. Describe the workings and uses of fibre optics. | **5 Optics and Optical Fiber**
5.1 Optics
5.1.1 Revision of reflection and refraction of light.
5.1.2 Laws of refraction, Snell's law.
5.1.3 Prism formula (derivation), Numerical.

5.2 Optical Fibers:
5.2.1 Principle of propagation of light through optical fiber.
5.2.2 Structure of Optical fiber.
5.2.3 Applications (electronics and medical) and comparison with electrical cable for communication.

Course Outcome: CO5
Teaching Hours :8hrs
Marks: 14 |

V. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Practical / Tutorial / Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	**LLO a.** Use of measuring instruments **LLO b.** Find the least count and range of the instruments. **LLO c.** Interpretation of graph and use of scientific calculator.	To know your Physics laboratory and Use of Scientific Calculator	2	CO1
2	**LLO a.** Use Vernier caliper to Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. **LLO b.** Estimate the errors in measurement.	To measure the dimensions of given objects and to determine their volume using Vernier caliper	2	CO1
3	**LLO a.** Identify types of motion **LLO b.** Determine the value of acceleration due to gravity.	To determine Acceleration due to gravity by simple pendulum	2	CO2
4	**LLO a.** Verify Coulomb's law of electrostatics.	To verify Coulomb's law of electrostatics	2	CO3
5	**LLO a.** Apply Ohm's law to solve circuit problems.	To verify Ohm's Law.	2	CO4
6	**LLO a.** Explain refraction of light. **LLO b.** Determine refractive index of a given prism	To find refractive index of a given prism by using pin method.	2	CO5

7	**LLO a.** Use Micrometer Screw gauge to: Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. **LLO b.** Estimate the errors in measurement.	To measure the dimensions of given objects and to determine their Volume using micrometer screw gauge..	2	CO1
8	**LLO a.** Identify type of motion **LLO b.** Calculate the stiffness constant	To determine stiffness constant by using helical spring.	2	CO2
9	**LLO a.** Verify principle of potentiometer	To verify principle of potentiometer.	2	CO3
10	**LLO a.** Obtain the balancing condition of Wheatstone's network	To find unknown resistance by using Wheatstone's Bridge.	2	CO4
11	**LLO a.** Use magnetic compass to draw the magnetic lines of forces of magnet of different shapes and determine neutral points.	Determination of neutral points by magnetic compass.	2	CO5
12	**LLO a.** Verify law of series connection of resistors.	To find resultant resistance when resistances are connected in series and parallel.	2	CO4
13	**LLO a.** Determine the specific resistance of given wire.	Determination of specific resistance of given wire.	2	CO4
14	**LLO a.** Study the properties of light TIR **LLO b.** Determine the critical angle	To study total internal reflection and to determine the critical angle.	2	CO5
15	**LLO a.** Define unit and classify into different types of units	Showing Video on different applications related to units,	2	CO1

Note: 10 to 12 experiments should be performed in a term for completion of TW.

VI. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning): (Minimum 10 Assignments)

1. Convert the units of a given physical quantity from one system of units to another

2. Measure room temperature of hot baths / bodies by using mercury thermometer and convert it into different units.

3. Prepare a chart to summarize units and measurements.

4. Use a digital vernier calliper and micrometre screw gauge for measurements. (Lab- based).

5. Make a paper scale of least count e.g. 0.01 cm, 0.2cm, 0.5cm.

6. What is the difference between speed and velocity?

7. What is motion? Describe Straight line motion.

8. Explain Average speed and Average velocity.
9.Write in detail about your experience of various, types of motion while riding a bicycle on a road.
10.Identify the types of motion.

(a) Movement of the earth around the sun: ....
(b) Movement of a ceiling fan: ....
(c) A meteor falling from the sky: ....
(d) A rocket launched from the ground: ....
(e) A fish swimming in water: ....
f) The plucked string of a sitar: ...

11. Sketch the electric lines of force for two- point charges q1 and q2 (q1 > q2) separated by a distance d.

12. What kind of charges are produced on each, when (i) a glass rod is rubbed with silk and (ii) an ebonite rod is rubbed with wool?

13. How the mass of a body is affected on charging?

14. Find the Answer:

S. No.	V (Volt)	I (Ampere)	R (Ω)
1.	?	0.75	80
2	220	?	400
3	60	4	?
4	220	?	100
5	300	5	?

15. An electric motor takes 5A from an source of 220v . Determine the power of the motor and energy consumed in 2 hrs.

16. What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?

17. Prepare a simulation on Ohm's law.

18. Prepare a simulation on Fleming's left- hand right-hand rule

19. Solve 5 problems on law of resistances in series and parallel.

20. To demonstrate T.I.R and working of optical fiber.

VII. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Unit and Measurements	2	4	4	10
2	Motions	4	4	8	16
3	Electrostatics	4	4	4	12
4	Electricity and Electromagnetism	2	8	8	18
5	Optics and Optical Fibers	4	4	6	14
	Total	**16**	**24**	**30**	**70**

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on process and product related performance indicators(25marks)
Summative Assessment (Assessment of Learning)

* End term examination, Viva-voce, Workshop performance (25 marks)

VIII. Suggested COs - POs Matrix Form(Computer Engineering)

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3			2			2	1	2	
CO2	3						2	1		
CO3	3				1		2	1	2	
CO4	3			2	1		2	1	1	
CO5	3			2			2	1	2	
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

VIII.Suggested COs - POs Matrix Form(Information Technology)

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design / Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO - 1	PSO- 2	PSO-3
CO1	3			2			2	1	2	
CO2	3						2	1		
CO3	3				1		2	1	2	
CO4	3			2	1		2	1	1	
CO5	3			2			2	1	2	
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

IX.Learning Materials / Books
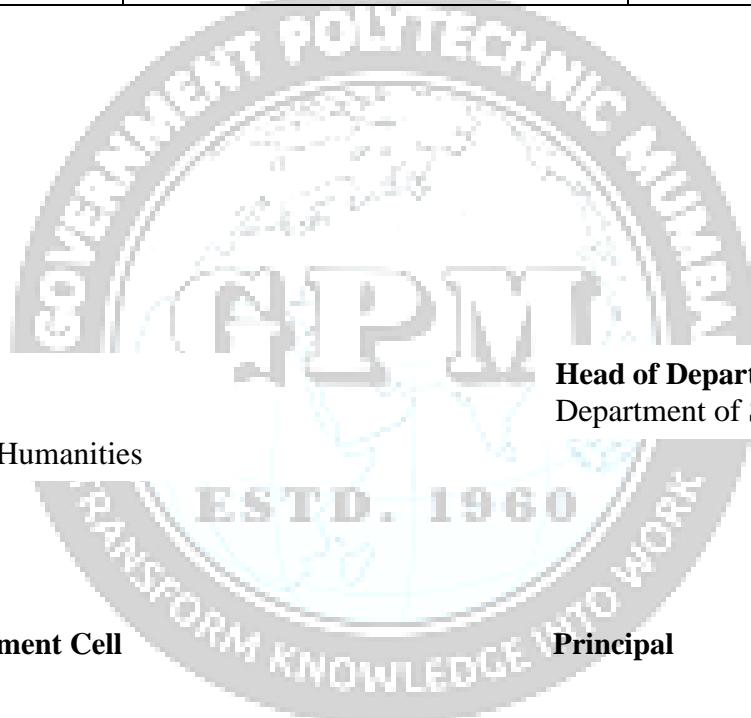
Sr.No.	Author		Publisher
1	R K Gaur &; S L Gupta	Engineering Physics	Dhanpati Rai Pub.
2	Prof. Arthur Beiser	Applied Physics	Tata McGraw hill Pub.
3	D K Bhattacharya	Engineering Physics	Oxford University press
4	NCERT / MSBSHSE	Physics 1 & 2	NCERT/MSBSHSE
5	Halliday &Resnick Wiley	`Physics Vol 1 & 2	Wiley India
6	Brijlal& Subrahmanyam	Principle of physics	S. CHAND & COMPANY
7	R K Gaur & S L Gupta.	Engineering Physics	Dhanpati Rai Pub.

X. Learning Websites & Portals

Sr. No	Link / Portal	Description
1	https://sunitathorat1310.wixsite.com/website-1	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
2	www.physicsclassroom.com	Concept of basic physics
3	www.physics.org	Concept of basic physics
4	www.physics.brown.edu	Concept of basic physics
5	www.amazon.com/Basic-Physics	Concept of basic physics
6	http: //scienceworld.wolfram.com/physics/	Concept of basic physics
7	http: //en.wikipedia.org/wiki	Concept of basic physics
8	http: //hyperphysics.phy-astr.gsu.edu/hbase	Concept of basic physics
9	www.msu.edu/~brechtjo/physics	Concept of basic physics
10	www.answers.com/topic/list-of-basic-physics-topics	Concept of basic physics
11	www.answers.com/topic	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
12	www.vlab.amrita.edu	All Experiments video
13	www.olabs.edu.in	All Experiments video
14	https: //praxilabs.com/en/	All Experiments video
15	www.phet.colorado.edu	Simulation of Topics

XI.Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr.Y.A. Mahajan	Selection Grade Lecturer in physics	Bhausaheb Vartak Polytechnic, Vasai
2	Mr. S.S. Salve	Senior Lecturer in physics	S.B.M. Polytechnic, Vile -Parle
3	Mrs.B.J. Chaudhari	Lecturer in physics	Government Polytechnic, Thane
4	Mrs. S.A. Thorat	Lecturer in physics	Government Polytechnic, Mumbai

Coordinator
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Head of Departments
Department of Science & Humanities

I/C, Curriculum Development Cell   **Principal**