KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Curriculum as Per NEP

Physics Subject Syllabus
Semester 3

W.E.F. June 2024

KADI SARVA VISHWAVIDYALAYA
B.Sc Semester 3 (Physics Subject's Syllabus)
Physics Major Course -5

PHM227-2C Basic Physics-III

LEARNING OUTCOMES:

- Understand the concept of origin of Physical Science.
- Develop a concrete understanding of the Physical systems around us.
- Gain knowledge about the various laws of nature, new frontier of physics with potential applications in our day-by-day life.
- Gain the knowledge of physics behind the applications of diffraction and Crystal Structure.
- Understanding of concepts of Ordinary Differential equation and Applications and applications of Maxwell's equations.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Theory Hrs Per Week		Hrs.	Max Marks		
					CCE	SEE	
PHM227-2C	Basic Physics-III	4	4	2.5	50	50	100

Unit 1: Diffraction   **Teaching Hours: 15 (Weightage 25%)**

Distinction between Interference and diffraction, Fresnel and Fraunhoffer types of diffraction, Fraunhoffer diffraction at a single slit, Fraunhoffer diffraction at a single slit (Calculus method), Fraunhoffer diffraction at a double slit, Fraunhoffer diffraction at double slit (Calculus method), Distinct between single slit and double slit diffraction pattern, Fraunhoffer diffraction at N slit, Plane diffraction grating, Theory of plane transmission grating, Dispersive power of Grating, Illustrative examples

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Unit 2: Crystal Structure   **Teaching Hours: 15 (Weightage 25%)**

Crystalline and Amorphous Solids, Crystal Lattice and Crystal Structure, Translational Symmetry, Space, Unit Cell and Primitive Cell, Symmetry Elements in Crystals, The Seven crystal Systems, Coordination Number, some importance crystal structure, Simple Cubic Structure, Body Centered Cubic Structure, Face Centered Cubic Structure, Wigner-Seitz Cells, Miller Indices, the inter planner spacing of a set of crystal planes, Illustrative examples.

Unit-3 <u>Ordinary Differential equation and Applications</u> Teaching Hours: 15 (Weightage 25%)

Introduction, Separable Equations, Linear First-Order Equations, Other Methods for First-Order Equations, Second-Order Linear Equations with Constant Coefficients and Zero Right Hand Side, Second-Order Linear Equations with Constant Coefficients and Right-Hand Side Not Zero, Illustrative Examples.

Unit-4 <u>Electromagnetism</u>Teaching Hours: 15 (Weightage 25%)

Waves in One Dimension, Three-Dimensional Wave Equation, Transverse Waves on a Stretched String, Stroboscope or Strobe, Illustrated Problems.

Maxwell's Equations, Propagation of Plane Electromagnetic Waves in Matter, Energy Flow and Poynting Vector, Radiation Pressure, Polarization of Electromagnetic Wave, Illustrated Problems.

• *Continuous Evaluation: It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests

Reference Books

1) Mathematical Methods in Physical Sciences by M. L. Boas, John Wiley & Sons
2) Mathematical Physics byP. K. Chattopadhyay, New Age International Publishers
3) A textbook of Optics by N Subrahmanyam, Brij Lal& M.N. Avadhanulu, S.Chand
4) Optics by Ajoy Ghatak, McGraw-Hill Education
5) Elements of Solid-State Physics by J. P. Srivastava, PHI Learning
6) Introduction to Solid State Physics by C. Kittle, John Wiley & Sons
7) Waves and Oscillations, R. N. Chaudhuri, New Age International Publishers
8) Introduction to Electrodynamics, David J. Griffiths, Pearson Education

KADI SARVA VISHWAVIDYALAYA
B.Sc Semester 3 (Physics Subject's Syllabus)
Physics Major Course -6

PHM228-2C Basic Physics-IV

LEARNING OUTCOMES:
- Understand the concept of origin of Physical Science.
- Develop a concrete understanding of the Physical systems around us.
- Gain knowledge about the various laws of nature, new frontier of physics with potential applications in our day-by-day life.
- Gain the knowledge of physics behind the applications of Electrostatics and Transistors.
- Understanding of concepts of special theory of Relativity, applications of Heat and Thermodynamics.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Theory Hrs Per Week		Hrs.	Max Marks		
					CCE	SEE	
PHM228-2C	Basic Physics-IV	4	4	2.5	50	50	100

Unit 1: Electrostatics　　　　　　　　　　**Teaching Hours: 15 (Weightage 25%)**

Introduction-Gradient, Divergence and curl, Divergence of electrostatic field, curl of electrostatic field, Introduction to potential, Poisson's equation and Laplace's equation, The potential of a localized charge distribution, The work done in moving a charge, the energy of a point charge distribution, the energy of a continuous charge distribution, Illustrative Examples. related Problems

Unit 2: Transistors　　　　　　　　　　**Teaching Hours: 15 (Weightage 25%)**

Basics of Transistor, Transistor current component, Leakage current, Characteristics of transistor, Common base configuration static characteristics, Common emitter configuration static characteristics, importance of characteristics, Load Line, Operating point, Illustrative Examples.

Principle and working of JFET, Importance of JFET, Difference between JFET and BJT, Characteristics of JFET, Advantages of JFET, UJT, Characteristics of UJT, Advantages of UJT,

Application of UJT, Illustrative Examples. related Problems

Unit-3 <u>Special theory of Relativity</u>   **Teaching Hours: 15 (Weightage 25%)**

Newtonian Relativity, Michelson-Morley experiment, Special theory of relativity, Lorentz Transformation, Consequences of Lorentz Transformation-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities, Mass-energy relation, Space time or Minkowski four-dimensional continuum, related Problems.

Unit-4 <u>Heat and Thermodynamics</u>   **Teaching Hours: 15 (Weightage 25%)**

Characteristic functions, Enthalpy, TheHelmholtzand Gibb's function, Two Mathematical Theorems, Maxwell's equations, TheT-dsequations, Energy equation, The Thermal Expansivity, Compressibility, Joule-Kelvin effect (Porous plug Experiment),Lique faction of Gasesby Joule-Kelvin effect, Illustrative examples

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<u>Reference Books</u>

1) Introduction to Electrody namicsbyD. J.Griffiths, Pearson Education
2) Principles of Electronics byV.K. Mehta&RohitMehta, S.Chand
3) Introduction to Classical MechanicsbyR. G. Takwale&P. S. Puranik, Tata McGraw Hill
4) Heat and Thermodynamics by MarkW. Zeemansky& Richard H. Dittman, McGraw Hill

KADI SARVA VISHWAVIDYALAYA
B.Sc Semester 3 (Physics Subject's Syllabus)
Physics Major Course -7
PHM229-2C Physics Practical – III

LEARNING OUTCOMES Understand the concept of measurement of Logic gates.

- Use of Spherometer and measurement of radius of curvature of lens.
- Graph and Characteristics plotting.
- Use of Telescope, Use of Spectrometer.
- Knowledge of Bar pendulum and calculation of value of 'g'
- Gain the knowledge of vibration magnetometer.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme	Credits	Examination Scheme			Total Marks
		Practical Hrs Per Week		Hrs.	Max Marks		
					CCE	SEE	
PHM229-2C	Physics Practical - III	8	4	5	50	50	100

Unit-1	Teaching Hours : 60	(Weightage :50%)

1) To study the Basic Logic gates. (Discrete/IC)
2) To determine radius of curvature of lens using Spherometer.
3) L-C-R circuit with AC Source: Study of the series resonance with frequency variation.
4) Verification of Maximum power transfer theorem
5) Study of line spectra.
6) Determination of self-inductance 'L' of Inductor using AC Voltmeter & AC Ammeter.
7) To check the Parallel and series connections rules for Inductors.
8) To determine the Planck's constant using LED.
9) To determine the magnetic moment (M) using deflection magnetometer

Unit-2	Teaching Hours : 60	(Weightage :50%)

1) L-C-R circuit with AC Source: Study of the parallel resonance with frequency variation.
2) To determine the Planck's constant using LED.
3) To determine the ratio of magnetic moments of two magnets by using vibration magnetometer.
4) To study Common Base Transistor Characteristics (PNP).
5) To study the diffraction by Single Slit using spectrometer.
6) To measure the resolving power of Telescope.
7) To study the X-ray diffraction (Powder) Pattern.
8) Bar Pendulum: Determination of 'K' and 'g'.

Note:

1) New Experiments can be introduced AND / OR replaced as per need by the permission of the Head / Principal of the institute.

2) Hands-on / Project /Model etc. will carried out additionally for the enhancement of related skills

Physics Multidisciplinary Course – Semester 3
MDC223-2C Optical Fibers and Optoelectronic Devices

LEARNINGOUTCOMES:

- Understand the concept of origin of Physical Science.
- Develop an understanding of the Optical Fibers in internet communications and other applications.
- Gain the knowledge of optoelectronic devices as well as their applications.

TEACHINGANDEVALUATIONSCHEME:

Subject Code	Subject Title	Teaching Scheme		Credits	Hrs.	Examination Scheme		Total Marks
						Max Marks		
		Theory Hrs Per Week	Practical Hrs Per Week			CCE	SEE	
MDC223-2C	Optical Fibers and Optoelectronic Devices	2	4	4	2.5	50	50	100

Unit 1: Optical Fibers   **Teaching Hours: 15 (Weightage 25%)**

Introduction, Optical Fibers–Principle, Structure of Optical Fibers, Acceptance Angle and Cone, Numerical Aperture and Acceptance Angle, Types of Optical Fibers, Fabrication of Optical Fibers, Loss in Optical Fibers, Fiber Optical Communication, Fiber Optical Sensor, Classification of Optical Sensors, Fiber Endoscope, Applications of Optical Fibers, Illustrated Examples.

Unit 2: Optoelectronics Devices   **Teaching Hours: 15 (Weightage 25%)**

Fundamentals of Light,
Theory, Construction, Working & Applications with Illustrated Examples of;

i) Light Emitting Diode (LED)
ii) Liquid Crystal Displays
iii) P-N Junction Photodiode
iv) Photoconductive Cell
v) Phototransistor
vi) Photo voltaic or Solar Cell
vii) Laser Diode

KADI SARVA VISHWAVIDYALAYA
B.Sc Semester 3 (Physics Subject's Syllabus)

Practical   **Teaching Hours: 60   (Weightage 50%)**

1. To determine the Numerical Aperture and Acceptance angle of an optical fiber.
2. To study the characteristics of a different coloured LED.
3. To study the characteristics of a Photodiode.
4. To study the characteristics of a Photoconductive Cell.
5. To study the characteristics of aPhototransistor.
6. To study the characteristics of a Photo voltaic or Solar Cell and hence determine the power and Fill factor.
7. To study the characteristics of a Laser Diode.

Note:

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2) Hands-on / Project /Model etc. will carried out additionally for the enhancement of related skills.

• *Continuous Evaluation: It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests

Reference Books

1) Engineering Physics by V. Rajendran, McGraw Hill Education, New Delhi
2) A Textbook of Electrical Technology by B. L. Theraja, A. K. Theraja, S. Chand, New Delhi
3) Electronic Communications by Dennis Roddy, John Coolen, Pearson Education.

KADI SARVA VISHWAVIDYALAYA
B.Sc Semester 3 (Physics Subject's Syllabus)
Physics Skill Enhancement Course

SEC263-2C Physics in Biology and Medicine-I

LEARNINGOUTCOMES:
- Understand the concept of origin of Physical Science in biology and medicine.
- Understand the concepts of statics forces and friction on human body.
- Gain the physics knowledge of translation motion on human physical activity like jumping.

Subject Code	Subject Title	Teaching Scheme		Credits	Examination Scheme			Total Marks
					Hrs.	Max Marks		
		Theory Hrs Per Week	Practical Hrs Per Week			CCE	SEE	
SEC263-2C	Physics in Biology and Medicine-I	2	0	2	2	25	25	50

Unit-1: Static Forces and friction   **Teaching Hours: 15 (Weightage 50%)**

Equilibrium and stability, equilibrium consideration for human body, Stability of the human body under the action of an external force, Skeletal muscles, Levers, The Elbow, The Hip, The back, Standing Tip-toe on one foot, Dynamic aspects of Posture. Standing at an incline, Friction at the hip joint.

Unit-2:Translationmotion   **Teaching Hours: 15 (Weightage 50%)**

Vertical jump, Effectof gravity on the vertical jump, Running high jump, Range of a projectile, Standing broad jump, Running broad jump (long jump), Motion through air, Energy consumed in physical activity.

Reference Books

1) Physics in Biology and Medicine byPaulDavidovits,5thedition, Academic Press.