



પરિપત્ર:

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટીની સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજોનાં આચાર્યશ્રીઓને સવિનય જણાવવાનું કે સાયન્સ વિદ્યાશાખા હેઠળનો NEP-૨૦૨૦ અંતર્ગતનો ફિઝીક્સ વિષયનો (બી.એસ.સી. વિથ ઓનર્સ) નો સેમેસ્ટર-૧ (શિક્ષણ વિભાગની SOP પ્રામાણ્યેની પેપર સ્ટાઈલ સાથે), સેમેસ્ટર-૨ નો અભ્યાસક્રમ આ સાથે સામેલ છે.

માનનીય કુલપતિશ્રીની મંજૂરી અનુસાર સદર અભ્યાસક્રમ શૈક્ષણિક વર્ષ જુન, ૨૦૨૩થી અમલવારી કરવાની રહે છે. સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમ ચલાવતી તમામ સંલગ્ન કોલેજો ધ્વારા તેની અમલવારી કરવા જણાવવામાં આવે છે.



[Signature]
03/01/2024

ખાસ ફરજ પરના અધિકારી
(એકેડેમિક)

ક્રમાંક/બીકેએનએમયુ/એકેડેમિક/૪૦/૨૦૨૪

ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી,
સરકારી પોલીટેકનિક કેમ્પસ,
ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી રોડ,
ખડીયા, જૂનાગઢ-૩૬૨૨૬૩
તા.૦૩/૦૧/૨૦૨૪

પ્રતિ,

- ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી સંલગ્ન સાયન્સ વિદ્યાશાખાનાં અભ્યાસક્રમો ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ તરફ....

નકલ સાદર રવાના:-

- માન.કુલપતિશ્રી/કુલસચિવશ્રીનાં અંગત સચિવશ્રી.
- પરીક્ષા નિયામકશ્રી, ભક્તકવિ નરસિંહ મહેતા યુનિવર્સિટી, જૂનાગઢ

નકલ રવાના જાણ તથા યોગ્ય કાર્યવાહી અર્થે:

- સીસ્ટમ મેનેજરશ્રી, આઈ.ટી.સેલ વિભાગ (વેબસાઇટ ઉપર પ્રસિદ્ધ થવા અર્થે.)



Bhakta Kavi Narsinh Mehta University Junagadh



BOARD OF PHYSICS STUDIES
FACULTY OF SCIENCE
SYLLABUS FOR
BACHELOR OF SCIENCE (HONOURS) PROGRAMME
(SEMESTER- I & II)
EFFECTIVE FROM JUNE, 2023

INDEX

Sr. No.	Content	Page No.
1	Credit Structure	03
2	Important Instructions	04
3	MAJPHY111(Mechanics and Solid-State Electronics)	08
4	MAJPHY111(P) (Physics Practical)	12
5	MAJPHY112(Mechanics and Optics)	13
6	MAJPHY112(P) (Physics Practical)	16
7	MINPHY111(Mechanics and Solid-State Electronics)	18
8	MINPHY111(P) (Physics Practical)	22
9	MDCPHY111(Mechanics and Solid-State Electronics)	24
10	MDCPHY111(P) (Physics Practical)	28
11	SECPHY111(P) (Laboratory skills in physics)	30
12	PAPER STYLE	32

Subject: PHYSICS MAJOR/MINOR, MDC/IDC & SEC									
Faculty: Science									
Semester: 1									

Credit Structure

Sr. No.	Level UG/PG	Course Group Major/Minor/MDC/SEC/DSE	(Course Paper title)	Paper No.	Credit	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total mark
Sem-1											
1.	UG	Major	Physics (Theory)	MAJPHY111	3	45	25	50	-	-	75
2.	UG	Major	Physics (Practical)	MAJPHY111(P)	1	30	-	-	25	-	25
3.	UG	Major	Physics (Theory)	MAJPHY112	3	45	25	50	-	-	75
4.	UG	Major	Physics (Practical)	MAJPHY112(P)	1	45	-	-	25	-	25
5.	UG	Minor	Physics (Theory)	MINPHY111	3	45	25	50	-	-	75
6.	UG	Minor	Physics (Practical)	MINPHY111(P)	1	30	-	-	25	-	25
7.	UG	MDC/IDC	Physics (Theory)	MDCPHY 111	3	45	25	50	-	-	75
8.	UG	MDC/IDC	Physics (Practical)	MDCPHY111(P)	1	30	-	-	25	-	25
9.	UG	SEC	Physics (Practical)	SECPHY111(P)	2	30	-	-	25	25	50

DSC: Discipline Specific Course [**Major (Core), Minor (Elective)**]

MDC: Multi-Disciplinary Course,

IDC: Inter Disciplinary Course,

SEC: Skill Enhancement Course.

Important Instructions:

- One Theory credit equals 15 lecture hours per semester.
- One practical work credit equal 30 hours per week.
- Three credit course equals 45 hours of teaching per semester.
- Theory syllabus (Major/Minor/MDC) for any Semester consists of three units each.
- Lecture hours are distributed equally amongst all three units (15 for each)
- The question paper will be drawn by assigning equal weightage to all the units.
- Total marks for physics theory exam are 100 (Major/Minor/MDC) (70 marks Semester end exam and 30 marks continues internal assessment).
- Total marks for physics practical (Major/Minor/MDC/SEC) are 50 (35 marks Semester end exam and 15 marks continues internal assessment).
- The minimum passing standard for both the exams is exclusively 40 %.
- Common list of Reference books for all papers is given at the end of the syllabus.
- Theory Question paper style is also given at the end of the syllabus.

UG Certificate:

Students who opt to exit after completion of the first year (two Semesters) and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course (internship/ of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years.

Learning outcome descriptors of Program B. Sc. Physics (Honours) Graduate attributes

The student graduating with the programme of B.Sc. (Honours) Physics should be able to demonstrate the acquisition of:

- **Skills** Good communication skills are an essential ingredient of a successful career in sciences or elsewhere. Ability to conduct experiments, develop theories, to perform calculations, prepare technical reports.
- **Capacity to learn** Understanding the implications of new information's for both current and future problem solving and decision making.
- **Ability to further apply/extrapolate** theoretical and practical skills in physics and allied field to find the solutions of complex problems solving for the institute or as an entrepreneur or to solve societal problems.
- **Comprehensive knowledge** of falls under a broader category of science. physics is the branch of science which deals with matter and its relation to energy. It involves study of physical and natural phenomena around us. Physics as a subject is divided into six broad branches as mechanics, Geometrical optics, Electricity and magnetism, Thermodynamics, Atomic physics, Waves. Physics does not only relate the remaining two sciences subjects but also enjoys a relationship with other subjects as well physics & mathematics, physics & biology, physics & chemistry, physics & religion, physics & geography, physics & technology- in medicine, communication, in industrial application etc.
- **Practical, professional, and procedural knowledge** physics instruction addresses to lend some skills for students in order to notice physics phenomena in daily life. Characteristics of physics as the basic science direct the students practice the skill in finding the problem, design a solution and test solutions for problems as it finds answers to problems. Scientific thinking is an essential learning goal of science education and it can be fostered by inquiry learning. One important prerequisite for scientific thinking is procedural understanding.
- **Critical thinking** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- **Creativity** in solving simple problems related to physics problems by applying imaginative and lateral thinking from multiple perspectives.

- **Communicative skills** in terms of reading, understanding and delivering own thoughts through respectful language or in a technical, systematic acceptable way of communication.
- **Analytical reasoning** capability in evaluating data from a variety of sources through evidence-based validation.
- **Research related skills** in terms of solving problem in physics through acceptable research methodologies, problem formulation in physics, designing study project with clear aim and objectives of the project and reporting it sustaining the ethical values.
- **Coordinating/collaborating with others** for common cause and work efficiently as a member of research/work group.
- **Leadership readiness quality** during group project work preparations and execution or any other team work by sharing, motivating and working closely to achieve the clear objectives of the work.
- **Digital and technological skills and learning how to learn skills** for the independent task completion or problem solution using appropriate resources available ICT tools, open access platforms, software for data analysis or to work independently, acquire organizational skills and time management to achieve self-defined goals.
- **Multicultural competence** by interacting respectfully with diverse group of people, show inclusive spirit during completion of common group task and also by empathy for less advantaged, differently abled or people with learning disabilities.
- **Autonomy, responsibility and accountability** while completing the task assignment by applying knowledge and executing it in a demonstrative way considering safety, security, accountability and simultaneously maintaining ethical values.
- **Value inculcation** by maintaining ethical and moral standards in work and reporting of data, show environmental concerns and prepare sustainable projects and participate in sustainable development programs and follow ethical practices.

Learning outcome descriptors of Programme B. Sc. Physics

Certificate holder attributes

The student having with the certificate in B. Sc Physics should be able to demonstrate the acquisition of:

- **Flexibility** for learners to move from one institution to another to enable them to have multi and/or interdisciplinary learning.
- **Primary Skills** associated with optical, mechanical and electrical experimental set up and handling for small physical science laboratory or academic units. This also includes skills associated with handling of various spectrometer and electronic equipment for the accurate results of experiments.
- **Emergency response skill** to handle any laboratory accident including fire, short circuit or electrical hazard by acting logically and provide appropriate first aid including CPR.
- **Foundation knowledge** of physics and better understanding of its concepts explained through its main branches like mechanics, optics, solid-state physics etc in a multidisciplinary context.
- **Creativity** in solving simple problems related to physics laboratory or design device for electronic operation.
- **Practical, professional, and procedural knowledge** in carrying out some primary experiment and measure some quantity such as gravitational acceleration, poisson's ratio, various moduli and some other parameter related to practical physics which will help students to gain in-depth knowledge in the field of physical science.
- **Primary communicative skills** in terms of reading, understanding various protocols, expressing difficulties faced in executing work or concerns and delivering own thoughts through respectful language or in a technical language, systematic acceptable way of communication.
- **Ability and employability** in various primary physics laboratories as assistant to physicist/scientific officer in advanced laboratories, institute, or entrepreneur for self-employment.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MAJPHY111
(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the mechanical properties of materials and mechanics involves in the motion of particle as simple harmonic motion. In solid state electronics, some basic information of electronic components is provided and some special component such as Zener diode briefly explained. Students will unable to understand some methods which are very useful for the calculation of motion of particle and physical quantity of material.

On completion of the course, the students will be able to understand:

- Introduction of simple harmonic motion (SHM) and its example in real life (e.g. motion of block attached with spring)
- Simple harmonic motion can be representing as wave.
- Changes in different physical quantities during simple harmonic motion.
- Parameters are responsible for damped oscillation and modified equation of damped oscillations and forced oscillations.
- How stress and strain produce in the material and different types of elastic constant (e.g., young modulus, modulus of rigidity, bulk modulus etc.).
- Searl's method for calculation young modulus.
- Introduction of torsional pendulum and use of this pendulum.
- Classification of solid based on energy bandgap and introduction of semiconductor.
- Mechanism involves in the characteristics of diode and application of p-n diode and Zener diode.

Syllabus

UNIT – I

❖ Simple Harmonic Motion

[15 hours]

- Simple Harmonic Motion (12.1)
- Equation of Motion of Simple Harmonic Motion (12.3)
- Terms associated with Simple Harmonic Motion (12.4) (1) Amplitude (2) Time Period (3) Frequency (4) Phase
- Simple Harmonic Motion as a Projection of Uniform Circular Motion (12.5)
- Energy Conservation in Simple Harmonic Motion (12.6)
- Angular Simple Harmonic Motion (12.7)
- Simple Pendulum (12.8)
- Damped Harmonic Motion (12.12)
- Forced Oscillation & Resonance (12.13)
- Related Numerical.

Text Books: Points 1 to 10 From

- Concept of Physics Part – 1 H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

- Physics for Degree Students C.L.ARORA, P.S.HEMNE, Publishers: S.Chand.
- Engineering Physics By R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.
- New Principles of Physics Part - 1, Dr. N.Subraehmanyam, Brij Lal, Prof.A.S.Vasudeva, Publishers: S.Chand.

UNIT – II

❖ Elasticity

[15 hours]

- Introduction (7.1)
- Stress and Strain (7.2)
- Hooke's law (7.3)
- Young's modulus (7.4)
- Bulk modulus (7.5)
- Modulus of Rigidity (7.6)

- Poission's Ratio (7.7)
- Determination of Young's Modulus by Searle's Method (7.15)
- Torsion Pendulum (7.16)
- Uses of Torsion Pendulum (7.17)
- Applications of elasticity (self)
- Related Numerical.

Text Books: Points 1 to 12 From

- Engineering Physics by R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.

Reference Books:

- Elements of Properties of matter D.S. Mathur, Publishers: S.Chand.
- Concept of Physics Volume – 1 - H C Varma, Publishers: Bharti Bhavan.
- Physics for degree Students By C.L.Arora & P.S.Hemne, Publishers: S.Chand.
- Mechanics By D.C.Tayal, Himalaya Publishing House.
- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.

UNIT – III

❖ **Semiconductors**

[15 hours]

- Semiconductor (5.1)
- Commonly Used Semiconductors (5.4)
- Classification of solid and energy band (4.5)
- Energy Band Description of Semiconductors (5.5)
- Effect of Temperature on Semiconductors (5.6)
- Hole current (5.7)
- Intrinsic Semiconductor (5.8)
- Extrinsic Semiconductor (5.9)
- n – type Semiconductor (5.10)
- p – type Semiconductor (5.11)
- Majority and Minority Carriers (5.13)
- p – n junction (5.14)
- Properties of p – n Junction (5.15)
- Forward and Reverse Biasing of a p – n Junction (5.16)
- Current flow in a Forward Biased p – n Junction (5.17)
- V – I Characteristic of a p – n Junction (5.18)
- Breakdown Voltage & Knee Voltage (5.19)

- Zener diode (6.25)
- Related Numerical.

Text Books: Points 1 to 19 From

- Principles of electronics V.K.Mehta Rohit Mehta, Publishers: S.Chand.

Reference Books:

- Basic electronics and linear circuits By N. N.Bhargava, D.C.Kushreshtha, S.C.Gupta, Publishers: Technical Teachers Training Institute Chandigarh.
- Elements of Electronics By Bagde & Singh, Publishers: S.Chand.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MAJPHY111(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of vernier caliper and micrometer which very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of some physical quantities such as radius of gyration, moment of inertia, modulus of rigidity, young's modulus and electronic component like p-n diode and Zener diode.
- With knowledge students will get practical method for calculation of physical quantity.

Syllabus

1. To Study of errors in observation Using Vernier Calliper, Micrometer Screw.
2. To determine 'g' and radius of gyration using Bar Pendulum,
3. To determine the Moment of Inertia & Modulus of rigidity by Torsional pendulum.
4. To determine the Young's Modulus of long wire by Searl's method.
5. To study Semiconductor Diode Characteristics.
6. To study Zener diode Characteristics

Reference Books:

- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B. Saraf et.al -Physics through experiments Vol. I & II.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MAJPHY112
(Mechanics and Optics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course mainly designed for study of mechanics and optics. It will provide a broad knowledge of Newtonian mechanics, relativity and wave optics as well. It will help students to build a foundation of various branches of physics. This course makes the students able to understand the basic physics behind motion of all the objects around us in our daily life. It helps students to get deeper insight in wave optics to understand the physics of many optical instruments which are widely used in research and industry.

After successfully completing the course, students will be able to understand:

- Newton's laws of motion, Energy, work, momentum in detail.
- Various theories that explain physics behind rotational motion.
- Basic information of moment of inertia, torque and relation between them.
- How moment of inertia affects angular momentum.
- Special Theory of Relativity
- Diffraction and its types
- Difference between Fresnel diffraction and Fraunhofer Diffraction

Syllabus

UNIT – I

[15 hours]

❖ Laws of Motion & Dynamics of System of Particles

- Newton's laws of motion (5.1,5.2&5.4)
- Kinetic Energy (8.1)
- Work and Work-Energy theorem (8.2)
- Calculation of Work done (8.3)
- Conservative and Non – Conservative force (8.6)
- Potential Energy (8.5)

- Conservation of Energy (8.7)
- Centre of Mass (9.1)
- Centre of Mass of two Particles (9.1)
- Centre of Mass of Several group of Particles (9.1)
- Linear Momentum (9.4)
- Conservation of Linear Momentum (9.4)
- Related Numerical.

❖ Rotational Motion

- Rigid Body (10.1)
- Angular velocity (10.2)
- Angular momentum (10.2)
- Torque (10.4)
- Moment of Inertia (10.4)
- $\tau = I\alpha$ (10.5)
- Angular Momentum (10.8)
- $L = I\omega$ (10.9)
- Conservation of angular momentum (10.10)
- Theorem of Perpendicular Axes (10.15)
- Related Numerical.

Text Books: Points 1 to 24 From

- Concept of Physics Part – 1 By H C Verma, Publishers: Bharati Bhawan.

Reference Books:

- Mechanics Berkeley Physics Course Vol – 1.
- Lectures on Physics, R.P. Feynman, Vol – 1.
- Physics – Resnick and Halliday.

UNIT – II

[15 hours]

❖ Relativity

- Galilean Transformation (1.4)
- Ether Hypothesis (1.5)
- Michelson – Morley Experiment (1.6)
- Special Theory of Relativity (1.7)
- Lorentz Transformation (1.8)

- Length contraction (1.9)
- Time dilation (1.10)
- Relativity of simultaneity (1.11)
- Addition of velocities (1.12)
- Variation of mass with velocity (1.13)
- Mass – Energy relation (1.14)

Text Books: Points 1 to 11 From

- Modern Physics by R.Murugesan & Kiruthinga Sivaprasth, Publishers: S.Chand.

Reference Books:

- Concept of physics By H C Verma part 1 Publishers : Bharati Bhawan
- Sears and Zemansky's University Physics with modern physics By H D Young Publishers: PEARSON

UNIT – III

[15 hours]

❖ Diffraction

- Types of Diffraction (17.7)
- Fraunhofer Diffraction at Single slit (18.2)
- Fraunhofer Diffraction at Double Slit (18.4)
- Plane Diffraction grating (18.7)
- Fraunhofer Diffraction at Plane diffraction grating (18.7.1)
- Rectilinear Propagation of Light and Half – Period Zones (17.4)
- Zone Plate (17.5)
- Action of Zone Plate (17.5.1)
- Diffraction Pattern of a straight edge (17.10)
- Related Numerical.

Text Books: Points 1 to 10 From

- Text Books of OPTICS By N.Subrahmanyam, Brijlal, M.N.Avadhanulu, Publishers: S.Chand.

Reference Books:

- Principle of OPTICS By B.K.Mathur, Publishers: Gopal Printing.
- Fundamentals of Optics By Francis. A, Jenkins, Harvey E.White Publishers: Mc Graw Hill

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

B. Sc. Semester – I

MAJPHY112(P)

(Physics Practical)

Course Objectives and learning outcome

1 CREDIT (2 Hours/Week)

25 MARKS

The course will help to understand various concept of physics which will help students to understand new technology and they can develop new technology in the realm of physics. students will develop basic communications skill through working in group in performing laboratory experiments and by interpreting the results.

After successfully completion of the course, the student

- Will able to understand moment of inertia of rectangular body and also verify perpendicular and parallel axis theorem.
- Will able to understand strain and stress of material and application of poisson's ration.
- Will able to understand working of capacitor and application of capacitor in different electronic circuit.
- Will Use the potentiometer and projection method for determination low resistance of component.
- Will able to understand basic principle of potentiometer.
- Will understand working principle of tangent Galvanometer (T.G.) and application of T.G.

Syllabus

1. To determine the Moment of Inertia of rectangular body & prove law of perpendicular axis by Bifilar Suspension.
2. To determine the Poisson's ratio of rubber tube.
3. To study of Charging and Discharging of Capacitor and RC time constant.
4. To determine Low resistance by Potentiometer.
5. To determine Low resistance by Projection method.
6. To study of Tangent galvanometer (Constant of T.G. & Verification of Ohm's law, to find reduction factor of TG)

Reference Books:

- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B. Saraf et.al -Physics through experiments Vol. I & II.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MINPHY111
(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the mechanical properties of materials and mechanics involves in the motion of particle as simple harmonic motion. In solid state electronics, some basic information of electronic components is provided and some special component such as Zener diode briefly explained. Students will unable to understand some methods which are very useful for the calculation of motion of particle and physical quantity of material.

On completion of the course, the students will be able to understand:

- Introduction of simple harmonic motion (SHM) and its example in real life (e.g. motion of block attached with spring)
- Simple harmonic motion can be representing as wave.
- Changes in different physical quantities during simple harmonic motion.
- Parameters are responsible for damped oscillation and modified equation of damped oscillations and forced oscillations.
- How stress and strain produce in the material and different types of elastic constant (e.g., young modulus, modulus of rigidity, bulk modulus etc.).
- Searl's method for calculation young modulus.
- Introduction of torsional pendulum and use of this pendulum.
- Classification of solid based on energy bandgap and introduction of semiconductor.
- Mechanism involves in the characteristics of diode and application of p-n diode and Zener diode.

Syllabus

UNIT – I

❖ Simple Harmonic Motion

[15 hours]

- Simple Harmonic Motion (12.1)
- Equation of Motion of Simple Harmonic Motion (12.3)
- Terms associated with Simple Harmonic Motion (12.4) (1) Amplitude (2) Time Period (3) Frequency (4) Phase
- Simple Harmonic Motion as a Projection of Uniform Circular Motion (12.5)
- Energy Conservation in Simple Harmonic Motion (12.6)
- Angular Simple Harmonic Motion (12.7)
- Simple Pendulum (12.8)
- Damped Harmonic Motion (12.12)
- Forced Oscillation & Resonance (12.13)
- Related Numerical.

Text Books: Points 1 to 10 From

- Concept of Physics Part – 1 H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

- Physics for Degree Students C.L.ARORA, P.S.HEMNE, Publishers: S.Chand.
- Engineering Physics By R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.
- New Principles of Physics Part - 1, Dr. N.Subrahmanyam, Brij Lal, Prof.A.S.Vasudeva, Publishers: S.Chand.

UNIT – II

❖ Elasticity

[15 hours]

- Introduction (7.1)
- Stress and Strain (7.2)
- Hooke's law (7.3)
- Young's modulus (7.4)
- Bulk modulus (7.5)
- Modulus of Rigidity (7.6)
- Poission's Ratio (7.7)

- Determination of Young's Modulus by Searle's Method (7.15)
- Torsion Pendulum (7.16)
- Uses of Torsion Pendulum (7.17)
- Applications of elasticity (self)
- Related Numerical.

Text Books: Points 1 to 12 From

Engineering Physics by R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.

Reference Books:

- Elements of Properties of matter D.S. Mathur, Publishers: S.Chand.
- Concept of Physics Volume – 1 - H C Varma, Publishers: Bharti Bhavan.
- Physics for degree Students By C.L.Arora & P.S.Hemne, Publishers: S.Chand.
- Mechanics By D.C.Tayal, Himalaya Publishing House.
- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.

UNIT – III

❖ Semiconductors

[15 hours]

- Semiconductor (5.1)
- Commonly Used Semiconductors (5.4)
- Classification of solid and energy band (4.5)
- Energy Band Description of Semiconductors (5.5)
- Effect of Temperature on Semiconductors (5.6)
- Hole current (5.7)
- Intrinsic Semiconductor (5.8)
- Extrinsic Semiconductor (5.9)
- n – type Semiconductor (5.10)
- p – type Semiconductor (5.11)
- Majority and Minority Carriers (5.13)
- p – n junction (5.14)
- Properties of p – n Junction (5.15)
- Forward and Reverse Biasing of a p – n Junction (5.16)
- Current flow in a Forward Biased p – n Junction (5.17)
- V – I Characteristic of a p – n Junction (5.18)
- Breakdown Voltage & Knee Voltage (5.19)
- Zener diode (6.25)
- Related Numerical.

Text Books: Points 1 to 19 From

- Principles of electronics V.K.Mehta Rohit Mehta, Publishers: S.Chand.

Reference Books:

- Basic electronics and linear circuits By N. N.Bhargava, D.C.Kushreshtha, S.C.Gupta, Publishers: Technical Teachers Training Institute Chandigarh.
- Elements of Electronics By Bagde & Singh, Publishers: S.Chand.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MINPHY111(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of vernier calliper and micrometer which very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of some physical quantities such as radius of gyration, moment of inertia, modulus of rigidity, young's modulus and electronic component like p-n diode and Zener diode.
- With knowledge students will get practical method for calculation of physical quantity.

Syllabus

1. To Study of errors in observation Using Vernier Caliper, Micrometer Screw.
2. To determine 'g' and radius of gyration using Bar Pendulum.
3. To determine the Moment of Inertia & Modulus of rigidity by Torsional pendulum.
4. To determine the Young's Modulus of long wire by Searl's method.
5. To study Semiconductor Diode Characteristics.
6. To study Zener diode Characteristics

Reference Books:

- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B. Saraf et.al -Physics through experiments Vol. I & II.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

B. Sc. Semester – I

MDCPHY111

(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the mechanical properties of materials and mechanics involves in the motion of particle as simple harmonic motion. In solid state electronics, some basic information of electronic components is provided and some special component such as Zener diode briefly explained. Students will unable to understand some methods which are very useful for the calculation of motion of particle and physical quantity of material.

On completion of the course, the students will be able to understand:

- Introduction of simple harmonic motion (SHM) and its example in real life (e.g. motion of block attached with spring)
- Simple harmonic motion can be representing as wave.
- Changes in different physical quantities during simple harmonic motion.
- Parameters are responsible for damped oscillation and modified equation of damped oscillations and forced oscillations.
- How stress and strain produce in the material and different types of elastic constant (e.g., young modulus, modulus of rigidity, bulk modulus etc.).
- Searl's method for calculation young modulus.
- Introduction of torsional pendulum and use of this pendulum.
- Classification of solid based on energy bandgap and introduction of semiconductor.
- Mechanism involves in the characteristics of diode and application of p-n diode and Zener diode.

Syllabus

UNIT – I

❖ Simple Harmonic Motion

[15 hours]

- Simple Harmonic Motion (12.1)
- Equation of Motion of Simple Harmonic Motion (12.3)
- Terms associated with Simple Harmonic Motion (12.4) (1) Amplitude (2) Time Period (3) Frequency (4) Phase
- Simple Harmonic Motion as a Projection of Uniform Circular Motion (12.5)
- Energy Conservation in Simple Harmonic Motion (12.6)
- Angular Simple Harmonic Motion (12.7)
- Simple Pendulum (12.8)
- Damped Harmonic Motion (12.12)
- Forced Oscillation & Resonance (12.13)
- Related Numerical.

Text Books: Points 1 to 10 From

- Concept of Physics Part – 1 H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

- Physics for Degree Students C.L.ARORA, P.S.HEMNE, Publishers: S.Chand.
- Engineering Physics By R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.
- New Principles of Physics Part - 1, Dr. N.Subrahmanyam, Brij Lal, Prof.A.S.Vasudeva, Publishers: S.Chand.

UNIT – II

❖ Elasticity

[15 hours]

- Introduction (7.1)
- Stress and Strain (7.2)
- Hooke's law (7.3)
- Young's modulus (7.4)
- Bulk modulus (7.5)
- Modulus of Rigidity (7.6)
- Poission's Ratio (7.7)
- Determination of Young's Modulus by Searle's Method (7.15)
- Torsion Pendulum (7.16)
- Uses of Torsion Pendulum (7.17)

- Applications of elasticity (self)
- Related Numerical.

Text Books: Points 1 to 12 From

Engineering Physics by R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.

Reference Books:

- Elements of Properties of matter D.S. Mathur, Publishers: S.Chand.
- Concept of Physics Volume – 1 - H C Varma, Publishers: Bharti Bhavan.
- Physics for degree Students By C.L.Arora & P.S.Hemne, Publishers: S.Chand.
- Mechanics By D.C.Tayal, Himalaya Publishing House.
- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.

UNIT – III

❖ Semiconductors

[15 hours]

- Semiconductor (5.1)
- Commonly Used Semiconductors (5.4)
- Classification of solid and energy band (4.5)
- Energy Band Description of Semiconductors (5.5)
- Effect of Temperature on Semiconductors (5.6)
- Hole current (5.7)
- Intrinsic Semiconductor (5.8)
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- n – type Semiconductor (5.10)
- p – type Semiconductor (5.11)
- Majority and Minority Carriers (5.13)
- p – n junction (5.14)
- Properties of p – n Junction (5.15)
- Forward and Reverse Biasing of a p – n Junction (5.16)
- Current flow in a Forward Biased p – n Junction (5.17)
- V – I Characteristic of a p – n Junction (5.18)
- Breakdown Voltage & Knee Voltage (5.19)
- Zener diode (6.25)
- Related Numerical.

Text Books: Points 1 to 19 From

- Principles of electronics V.K.Mehta Rohit Mehta, Publishers: S.Chand.

Reference Books:

- Basic electronics and linear circuits By N. N.Bhargava, D.C.Kushreshtha, S.C.Gupta, Publishers: Technical Teachers Training Institute Chandigarh.
- Elements of Electronics By Bagde & Singh, Publishers: S.Chand.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MDCPHY111(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of vernier caliper and micrometer which very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of some physical quantities such as radius of gyration, moment of inertia, modulus of rigidity, young's modulus and electronic component like p-n diode and Zener diode.
- With knowledge students will get practical method for calculation of physical quantity.

Syllabus

1. To Study of errors in observation Using Vernier Caliper, Micrometer Screw.
2. To determine 'g' and radius of gyration using Bar Pendulum.
3. To determine the Moment of Inertia & Modulus of rigidity by Torsional pendulum.
4. To determine the Young's Modulus of long wire by Searl's method.
5. To study Semiconductor Diode Characteristics.
6. To study Zener diode Characteristics

Reference Books:

- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B. Saraf et.al -Physics through experiments Vol. I & II.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
SECPHY111(P)
(Laboratory skills in physics)

2 CREDITS (4 Hours/Week)

50 MARKS

Course Objectives and learning outcome

The course will provide its learners a primary practical exposure to the physics laboratory skills in terms of handling of electronic and optical instruments, various types of hazards and its safety measures including first aid and disaster management.

- To Understand the basic principles, construction, working of various measuring instruments and their applications.
- To acquire the knowledge about the basic concepts Vernier calipers, Micrometer screw, Spherometer, Wheatstone Bridge etc.
- To understand working function of Wheatstone Bridge

At the end of course students will be able to

- Understands the basic knowledge about working of various instruments and their application.
- Learn and understand construction and use of various measuring instruments.

Syllabus

Unit-1	Vernier Calipers: Introduction, Theory, Figure, Description of the instrument, Detail study of Least count, Method of taking observation with the help of Vernier Calipers. Micrometer Screw: Introduction, Theory, Figure, Description of the instrument, Definition of pitch and its determination, study of least count, Method of taking observation with the help of Micrometer Screw.
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Unit-2	Spherometer: Introduction, Theory, Figure, Description of the instrument, to determine the pitch of the screw, To determine the least count of the spherometer, Zero error, Derivation of the formula for the radius of curvature of a curved surface. Wheatstone Bridge: Introduction, Theory with figure, The figure of meter bridge used in laboratory, construction of Meter bridge. Post-Office box: Introduction, Theory, Circuit Diagram, Theoretical Circuit diagram, explanation of working with necessary formula.
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Practical examination mark distribution:

- a) Perform practical and calculate parameter for given practical. **[25 marks]**
- b) viva/Demonstration of practical skills related to identification and handling of equipment and Explanation of practical assignment work undertaken. **[15 marks]**
- c) Continuous internal assessment may also include active participation in activities and demonstration of skill achievement **[10 marks]**

Bhakta Kavi Narsinh Mehta University, Junagadh

Effective from June - 2023 Subject: All 3-Credit

course (NEP-2020) MAJPHY111,112,121,122,

MINPHY111,121, MDC111,121

(THEORY EXAM)

PAPER STYLE

Total mark: 70

Time: 2:30 hours

All the questions are compulsory.

Q. 1 Answer any 2 out of 3 from following questions. [UNIT-I] (10)

Q. 2 Answer any 2 out of 3 from following questions. [UNIT-II] (10)

Q. 3 Answer any 2 out of 3 from following questions. [UNIT-III] (10)

Q. 4 Answer any 5 out of 9 from following questions. [UNIT-I, II and III] (10)

Q. 5 Answer any 2 out of 3 from following questions. [UNIT-I, II and III] (10)

INDEX (Semester-II)

Sr. No.	Content	Page No.
1	Credit Structure	03
2	Important Instructions	04
3	MAJPHY211(Mechanics and Solid-State Electronics)	08
4	MAJPHY211(P) (Physics Practical)	12
5	MAJPHY212(Mechanics and Optics)	13
6	MAJPHY212(P) (Physics Practical)	17
7	MINPHY211(Mechanics and Solid-State Electronics)	18
8	MINPHY211(P) (Physics Practical)	22
9	MDCPHY211(Mechanics and Solid-State Electronics)	24
10	MDCPHY211(P) (Physics Practical)	28
11	SECPHY211(P) (Laboratory skills in physics)	30
12	PAPER STYLE	32
13	EVALUATION OF 100 MARKS	33

Subject: PHYSICS MAJOR/MINOR, MDC/IDC & SEC	
Faculty: Science	Semester: 2

Credit Structure

Sr. No.	Level UG/PG	Course Group Major/Minor/MDC/SEC/DSE	(Course Paper title)	Paper No.	Credit	Teaching Hours	Internal Marks	External Marks	Practical Internal Marks	Practical External Marks	Total mark
Sem-2											
1.	UG	Major	Physics (Theory)	MAJPHY211	3	45	50	25	-	-	75
2.	UG	Major	Physics (Practical)	MAJPHY211(P)	1	30	-	-	-	25	25
3.	UG	Major	Physics (Theory)	MAJPHY212	3	45	50	25	-	-	75
4.	UG	Major	Physics (Practical)	MAJPHY212(P)	1	45	-	-	-	25	25
5.	UG	Minor	Physics (Theory)	MINPHY211	3	45	50	25	-	-	75
6.	UG	Minor	Physics (Practical)	MINPHY211(P)	1	30	-	-	-	25	25
7.	UG	MDC/IDC	Physics (Theory)	MDCPHY211	3	45	50	25	-	-	75
8.	UG	MDC/IDC	Physics (Practical)	MDCPHY211(P)	1	30	-	-	-	25	75
9.	UG	SEC	Physics (Practical)	SECPHY211(P)	2	30	-	-	-	25	50

DSC: Discipline Specific Course [**Major (Core), Minor (Elective)**]

MDC: Multi-Disciplinary Course,

IDC: Inter Disciplinary Course,

SEC: Skill Enhancement Course.

Important Instructions:

- One Theory credit equals 15 lecture hours per semester.
- One practical work credit equal 30 hours per week.
- Three credit course equals 45 hours of teaching per semester.
- Theory syllabus (Major/Minor/MDC) for any Semester consists of three units each.
- Lecture hours are distributed equally amongst all three units (15 for each)
- The question paper will be drawn by assigning equal weightage to all the units.
- Total marks for physics theory exam are 100 (Major/Minor/MDC) (50 marks Semester end exam and 50 marks continues internal assessment).
- Total marks for physics practical (Major/Minor/MDC/SEC) are 25 marks.
- The minimum passing standard for both the exams is exclusively 36 %.
- Common list of Reference books for all papers is given at the end of the syllabus.
- Theory Question paper style is also given at the end of the syllabus.

UG Certificate:

Students who opt to exit after completion of the first year (two Semesters) and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course (internship/ of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years.

Learning outcome descriptors of Program B. Sc. Physics (Honours) Graduate attributes

The student graduating with the programme of B.Sc. (Honours) Physics should be able to demonstrate the acquisition of:

- **Skills** Good communication skills are an essential ingredient of a successful career in sciences or elsewhere. Ability to conduct experiments, develop theories, to perform calculations, prepare technical reports.
- **Capacity to learn** Understanding the implications of new informations for both current and future problem solving and decision making.
- **Ability to further apply/extrapolate** theoretical and practical skills in physics and allied field to find the solutions of complex problems solving for the institute or as an entrepreneur or to solve societal problems.
- **Comprehensive knowledge** of falls under a broader category of science. physics is the branch of science which deals with matter and its relation to energy. It involves study of physical and natural phenomena around us. Physics as a subject is divided into six broad branches as mechanics, Geometrical optics, Electricity and magnetism, Thermodynamics, Atomic physics, Waves. Physics does not only relate the remaining two sciences subjects but also enjoys a relationship with other subjects as well physics & mathematics, physics & biology, physics & chemistry, physics & religion, physics & geography, physics & technology- in medicine, communication, in industrial application etc.
- **Practical, professional, and procedural knowledge** physics instruction addresses to lend some skills for students in order to notice physics phenomena in daily life. Characteristics of physics as the basic science direct the students practice the skill in finding the problem, design a solution and test solutions for problems as it finds answers to problems. Scientific thinking is an essential learning goal of science education and it can be fostered by inquiry learning. One important prerequisite for scientific thinking is procedural understanding.
- **Critical thinking** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- **Creativity** in solving simple problems related to physics problems by applying imaginative and lateral thinking from multiple perspectives.

- **Communicative skills** in terms of reading, understanding and delivering own thoughts through respectful language or in a technical, systematic
- **Analytical reasoning** capability in evaluating data from a variety of sources through evidence-based validation.
- **Research related skills** in terms of solving problem in physics through acceptable research methodologies, problem formulation in physics, designing study project with clear aim and objectives of the project and reporting it sustaining the ethical values.
- **Coordinating/collaborating with others** for common cause and work efficiently as a member of research/work group.
- **Leadership readiness quality** during group project work preparations and execution or any other team work by sharing, motivating and working closely to achieve the clear objectives of the work.
- **Digital and technological skills and learning how to learn skills** for the independent task completion or problem solution using appropriate resources available ICT tools, open access platforms, software for data analysis or to work independently, acquire organizational skills and time management to achieve self-defined goals.
- **Multicultural competence** by interacting respectfully with diverse group of people, show inclusive spirit during completion of common group task and also by empathy for less advantaged, differently abled or people with learning disabilities.
- **Autonomy, responsibility and accountability** while completing the task assignment by applying knowledge and executing it in a demonstrative way considering safety, security, accountability and simultaneously maintaining ethical values.
- **Value inculcation** by maintaining ethical and moral standards in work and reporting of data, show environmental concerns and prepare sustainable projects and participate in sustainable development programs and follow ethical practices.

Learning outcome descriptors of Programme B. Sc. Physics

Certificate holder attributes

The student having with the certificate in B. Sc Physics should be able to demonstrate the acquisition of:

- **Flexibility** for learners to move from one institution to another to enable them to have multi and/or interdisciplinary learning.
- **Primary Skills** associated with optical, mechanical and electrical experimental set up and handling for small physical science laboratory or academic units. This also includes skills associated with handling of various spectrometer and electronic equipment for the accurate results of experiments.
- **Emergency response skill** to handle any laboratory accident including fire, short circuit or electrical hazard by acting logically and provide appropriate first aid including CPR.
- **Foundation knowledge** of physics and better understanding of its concepts explained through its main branches like mechanics, optics, solid-state physics etc in a multidisciplinary context.
- **Creativity** in solving simple problems related to physics laboratory or design device for electronic operation.
- **Practical, professional, and procedural knowledge** in carrying out some primary experiment and measure some quantity such as gravitational acceleration, poisson's ratio, various moduli and some other parameter related to practical physics which will help students to gain in-depth knowledge in the field of physical science.
- **Primary communicative skills** in terms of reading, understanding various protocols, expressing difficulties faced in executing work or concerns and delivering own thoughts through respectful language or in a technical language, systematic acceptable way of communication.
- **Ability and employability** in various primary physics laboratories as assistant to physicist/scientific officer in advanced laboratories, institute, or entrepreneur for self-employment.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

B. Sc. Semester – II

MAJPHY211

(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the effect of gravitation on the planet and phenomena which happening due to this field. How gravitation field concern in the satellite launching is also explained. In solid state electronics, different types of rectifier circuits are discussed, and basic information of transistor explained in the course.

On completion of the course, the students will be able to understand the gravitation laws and some physical quantity related to field, how gravitation field effect on satellite launching and its trajectory path and also will get idea for solving problem related to gravitation. From solid state electronic, student will get information about different circuits of rectifier and transistor which is basic building block of electronics.

Syllabus

UNIT – I

❖ Gravitation

[15 hours]

- Newton's Law of Gravitation (11.1)
- Gravitational Potential energy (11.3)
- Gravitational Potential (11.4)
- Gravitational Field (11.6)
- Planet and Satellites (11.10)
- Kepler's Laws (Definition only) (11.11)

- Weightlessness in a Satellite (11.12)
- Escape velocity (11.13)
- Basic idea of global positioning system (GPS) (self)
- Physiological effects on astronauts (self)
- Related Numerical.

Text books: Points 1 to 11 From

- Concept of Physics Part – 1 By H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

- Engineering Physics By R.K.Gaur, S.L.Gupta, Dhanpat Rai Publication.
- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.
- New Principle of Physics Part – I By N.Subrahmanyam, Brijlal, A.S. Vasudeva, Publishers: S.Chand.
- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley, Publishers: S.Chand.

UNIT – II

❖ Semiconductor Diode

[15 hours]

- Semiconductor diode (6.1)
- Crystal diode rectifiers (6.7)
- Half wave rectifier (6.8)
- Efficiency of half wave rectifier (6.10)
- Full – wave rectifier (6.11)
- Centre – tap full wave rectifier (6.12)
- Full wave bridge rectifier (6.13)
- Efficiency of full - wave rectifier (6.15)
- Ripple factor (6.18)
- Comparison of rectifiers (6.19)
- Filter circuits (6.20)
- Types of Filter Circuits (6.21)
- Voltage stabilization (6.24)
- Zener diode as voltage stabilizer (6.27)
- Related Numericals.

Text books: Points 1 to 15 From

- Principles of Electronics By V.K.Mehta & Rohit Mehta, Publishers: S.Chand. 11th edition.

Reference Books :

- Electronic Devices and Circuits By S.Salivahanan & N.Suresh Kumar, Publishers: Mc Graw Hill Edu.Pvt.Ltd.4th edition.
- Modern Physics By R. Murugesan & Kiruthiga Sivaprasath, Publishers: S.Chand.

UNIT – III

❖ Transistor

[15 hours]

- Transistor (8.1, 8.2 & 8.3)
- Transistor action (8.4)
- Transistor symbols (8.5)
- Transistor connections (8.7)
- Common base connection (8.8)
- Characteristics of common base connection (8.9)
- Common emitter connection (8.10)
- Characteristics of common emitter connection (8.12)
- Transistor Biasing (9.2)
- Inherent Variations of Transistor Parameters (9.3)
- Stabilization (9.4)
- Stability Factor (9.6)
- Methods of Transistor Biasing
- Base Register Method (9.8)
- Emitter Bias Circuit (9.9 & 9.10)
- Biasing with collector Feedback Register (9.11)
- Voltage divider Bias Method (9.12)
- Related Numericals.

Text Books: Points 1 to 18 From

- Principles of Electronics By V.K.Mehta, Rohit Mehta, Multicolor Revised Edition Reprint – 2016.

Reference Books :

- Modern Physics By R. MURUGESHAN, KIRUTHIGA SIVAPRASATH, Publishers: S. Chand.
- Fundamentals of Electronics By D.C.Tayal, Praveen Tayal, Himalaya Publishing House.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
MAJPHY211(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of multi-meter and galvanometer which is very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of standing waves, experiment of resonator and deflection magnetometer.
- In electronics part, experiment of transformer, diode as rectifier and characteristics of transistor demonstrated.
- With this practical knowledge student will understand the concept of physics and can design new circuits for applications.

Syllabus

Practical 1: Melde's Experiment.

Practical 2: Study of Resonator.

Practical 3: Deflection Magnetometer.

Practical 4: Study of Transformer.

Practical 5: P - N Junction diode as Full Wave Rectifier.

Practical 6: Characteristics of Photo diode.

Practical 7: Characteristics of Common Base Transistor. (input & output)

Practical 8: Characteristics of Common Emitter Transistor. (input & output)

Practical 9: P - N Junction diode as Bridge Rectifier.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – I
MAJPHY212
(Mechanics and Optics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course mainly designed for study of mechanics and optics. It will provide a broad knowledge of wave mechanics and wave optics as well. It will help students to build a foundation of various branches of physics. This course makes the students able to understand the basic physics behind formation of waves and different types of wave motion. It helps students to get deeper insight in wave optics to understand the physics of many optical instruments which are widely used in research and industry.

After successfully completing mechanics part of the course, students will be able to understand the types of waves, how it behaves in different medium, mathematics expression for wave motion, examples of transverse and longitudinal wave and sound waves.

After successfully completing optics part of the course, students will be able to understand interference, which is one of the optical phenomena, Types of interference, different method for interference, and in-depth study of x-ray and its applications in various field. At the end of course, brief introduction of natural radioactivity also discussed.

Syllabus

UNIT – I

[15 hours]

❖ WAVES

- Wave Motion (2.1)
- Characteristics of Wave Motion (2.2)
- Equation of a simple Harmonic Wave (2.3)
- Differential Equation of Wave Motion (2.4)
- Particle Velocity and Wave Velocity (2.5)

❖ **Vibrating in Strings:**

- Velocity of Transverse waves along a Stretched String (4.1)
- Law of Transverse Vibration of Strings (4.2)
- Verification of the Laws of Transverse Vibration of Strings (4.3)
- Related Numericals.

Text Books: Points 1 to 9 From

Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.

Sound Waves:

- Speed of a Sound Wave in a Material Medium (16.3)
- Speed of Sound in a gas: Newton's formula and Laplace's Correction (16.4)
- Acoustics of Buildings (16.16)
- Related Numerical.

Text Books: Points 1 to 4 From

- Concept of Physics By H.C.Varma Part - 1 Publishers: Bharati Bhawan.

Reference Books:

- Sears and Zemansky's University Physics with modern Physics By H.D. Young, Publishers: PEARSON.

UNIT – II

[15 hours]

❖ **Interference**

- Principle of Superposition (26.1)
- Interference of Light (26.2)
- Young's Experiment (26.3)
- Analytical Treatment of Interference (26.4)
- Theory of Interference Fringes (26.5)
- Conditions for Interference of Light (26.6)
- Types of Interference (26.7)
- Fresnel's Biprism (26.8)

- Lloyd's Single Mirror (26.12)
- Interference in Thin Films (26.14)
- Wedge – Shaped Film (26.15)
- Newton's Rings (26.17)
- Related Numericals.

Text Books: Points 1 to 13 From

- Engineering Physics By R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.

Reference Books:

- A Textbook of Optics By Dr.N.Subrahmanyam, Brijlal, Dr.M.N.Avadhanulu, Publishers: S.Chand.
- Fundamentals of Optics By Francis.A.Jenkins, Harvey E.White, Publishers: Mc Graw
- Hill Edu.Pvt.Ltd.

UNIT – III

[15 hours]

❖ **X - rays**

- Production of X - rays (8.1)
- Origin of X - ray (8.2)
- X - ray Spectrum (8.3)
- Intensity Measurement of X - rays (8.7)
- Wave nature of X - ray (8.10)
- Laue's Spot & Uses (8.11 & 8.12)
- Bragg's Spectrometer (8.13)
- Theory of Diffraction (8.14)
- Bragg's Law (8.15)
- Compton effect (8.20)
- Properties of X - rays (8.21)
- Practical applications of X - rays (industrial, scientific, medical) (8.22)

Natural Radioactivity:

- Radioactivity (11.1)
- Natural and Artificial Radioactivity (11.2)
- General Properties of Radioactive Radiation (11.3)

- Properties of α - rays (11.6)
- Properties of β - rays (11.7)
- Properties of γ - rays (11.10)
- Radioactive Disintegration (11.12)
- Law of Radioactive Disintegration (11.13)
- Decay Constant (11.14)
- Half – life Period (11.15)
- Average life (11.16)
- Related Numerical.

Text Books: Points 1 to 24 From

- Modern Physics By B.L.Theraja, Publishers : S.Chand.

Reference Books:

- Concept of Physics Volume - 2 By H. C. Verma, Publishers: Bharti Bhawan.
- Engineering Physics by R.K.Gaur, S.L.Gupta, Publishers: Dhanpat Rai.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
MAJPHY212(P)
(Physics Practical)

Course Objectives and learning outcome

1 CREDIT (2 Hours/Week)

25 MARKS

The course will help to understand various concept of physics which will help students to understand new technology and they can develop new technology in the realm of physics. Students will develop basic communications skill through working in group in performing laboratory experiments and by interpreting the results.

After successfully completion of the course, the student can determine the unknown wavelength using spectrometer and newton's ring. Also understand the Dispersive curve of a Prism. Value of capacitance and inductance will be calculated using series and parallel connections. Students will also get practical knowledge of grating and will calculate Young's Modulus by bending of beam.

Syllabus

Practical 1: Calibration of Spectrometer & determination of unknown wavelength.

Practical 2: Dispersive curve of a Prism.

Practical 3: Newton's rings, Determination of Wavelength λ using Sodium light.

Practical 4: Determination of the capacity 'C' of Capacitor.

(verification of Series & Parallel connection of capacitor)

Practical 5: Determination of self-inductance 'L' of inductor.

(verification of series & Parallel connection of inductor)

Practical 6: Resolving Power of grating.

Practical 7: Young's Modulus by bending of beam.

Practical 8: Simulation of radioactive decay.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY

B. Sc. Semester – II

MINPHY211

(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the effect of gravitation on the planet and phenomena which happening due to this field. How gravitation field concern in the satellite launching is also explained. In solid state electronics, different types of rectifier circuits are discussed and basic information of transistor explained in the course.

On completion of the course, the students will be able to understand the gravitation laws and some physical quantity related to field, how gravitation field effect on satellite launching and its trajectory path and also will get idea for solving problem related to gravitation. From solid state electronic, student will get information about different circuits of rectifier and transistor which is basic building block of electronics.

Syllabus

UNIT – I

❖ Gravitation

[15 hours]

- Newton's Law of Gravitation (11.1)
- Gravitational Potential energy (11.3)
- Gravitational Potential (11.4)
- Gravitational Field (11.6)
- Planet and Satellites (11.10)
- Kepler's Laws (Definition only) (11.11)

- Weightlessness in a Satellite (11.12)
- Escape velocity (11.13)
- Basic idea of global positioning system (GPS) (self)
- Physiological effects on astronauts (self)
- Related Numerical.

Text books: Points 1 to 11 From

- Concept of Physics Part – 1 By H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

- Engineering Physics By R.K.Gaur, S.L.Gupta, Dhanpat Rai Publication.
- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.
- New Principle of Physics Part – I By N.Subrahmanyam, Brijlal, A.S. Vasudeva, Publishers: S.Chand.
- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley, Publishers: S.Chand.

UNIT – II

❖ **Semiconductor Diode**

[15 hours]

- Semiconductor diode (6.1)
- Crystal diode rectifiers (6.7)
- Half wave rectifier (6.8)
- Efficiency of half wave rectifier (6.10)
- Full – wave rectifier (6.11)
- Centre – tap full wave rectifier (6.12)
- Full wave bridge rectifier (6.13)
- Efficiency of full - wave rectifier (6.15)
- Ripple factor (6.18)
- Comparison of rectifiers (6.19)
- Filter circuits (6.20)
- Types of Filter Circuits (6.21)
- Voltage stabilization (6.24)
- Zener diode as voltage stabilizer (6.27)
- Related Numericals.

Text books: Points 1 to 15 From

- Principles of Electronics By V.K.Mehta & Rohit Mehta, Publishers: S.Chand. 11th edition.

Reference Books :

- Electronic Devices and Circuits By S.Salivahanan & N.Suresh Kumar, Publishers: Mc Graw Hill Edu.Pvt.Ltd.4th edition.
- Modern Physics By R. Murugesan & Kiruthiga Sivaprasath, Publishers: S.Chand.

UNIT – III

❖ Transistor

[15 hours]

- Transistor (8.1, 8.2 & 8.3)
- Transistor action (8.4)
- Transistor symbols (8.5)
- Transistor connections (8.7)
- Common base connection (8.8)
- Characteristics of common base connection (8.9)
- Common emitter connection (8.10)
- Characteristics of common emitter connection (8.12)
- Transistor Biasing (9.2)
- Inherent Variations of Transistor Parameters (9.3)
- Stabilization (9.4)
- Stability Factor (9.6)
- Methods of Transistor Biasing
- Base Register Method (9.8)
- Emitter Bias Circuit (9.9 & 9.10)
- Biasing with collector Feedback Register (9.11)
- Voltage divider Bias Method (9.12)
- Related Numericals.

Text Books: Points 1 to 18 From

- Principles of Electronics By V.K.Mehta, Rohit Mehta, Multicolor Revised Edition Reprint – 2016.

Reference Books :

- Modern Physics By R. MURUGESHAN, KIRUTHIGA SIVAPRASATH, Publishers: S. Chand.
- Fundamentals of Electronics By D.C.Tayal, Praveen Tayal, Himalaya Publishing House.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
MINPHY111(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of multi-meter and galvanometer which is very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of standing waves, experiment of resonator and deflection magnetometer.
- In electronics part, experiment of transformer, diode as rectifier and characteristics of transistor demonstrated.
- With this practical knowledge student will understand the concept of physics and can design new circuits for applications.

Syllabus

Practical 1: Melde's Experiment.

Practical 2: Study of Resonator.

Practical 3: Deflection Magnetometer.

Practical 4: Study of Transformer.

Practical 5: P - N Junction diode as Full Wave Rectifier.

Practical 6: Characteristics of Photo diode.

Practical 7: Characteristics of Common Base Transistor. (input & output)

Practical 8: Characteristics of Common Emitter Transistor. (input & output)

Practical 9: P - N Junction diode as Bridge Rectifier.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
MDCPHY211
(Mechanics and Solid-State Electronics)

3 CREDITS (3 Hours/Week)

50 MARKS

Course Objectives and learning outcome

This course will provide a basic introduction to understand the important aspects of mechanics and solid-state physics. In mechanics, it is designed to understand the effect of gravitation on the planet and phenomena which happening due to this field. How gravitation field concern in the satellite launching is also explained. In solid state electronics, different types of rectifier circuits are discussed and basic information of transistor explained in the course.

On completion of the course, the students will be able to understand the gravitation laws and some physical quantity related to field, how gravitation field effect on satellite launching and its trajectory path and also will get idea for solving problem related to gravitation. From solid state electronic, student will get information about different circuits of rectifier and transistor which is basic building block of electronics.

Syllabus

UNIT – I

❖ Gravitation

[15 hours]

- Newton's Law of Gravitation (11.1)
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- Escape velocity (11.13)

- Basic idea of global positioning system (GPS) (self)
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- Concept of Physics Part – 1 By H.C.Varma, Publishers: Bharti Bhavan.

Reference Books:

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- Modern Engineering Physics By A.S.Vasudeva, Publishers: S.Chand.
- New Principle of Physics Part – I By N.Subrahmanyam, Brijlal, A.S. Vasudeva, Publishers: S.Chand.
- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley, Publishers: S.Chand.

UNIT – II

❖ Semiconductor Diode

[15 hours]

- Semiconductor diode (6.1)
- Crystal diode rectifiers (6.7)
- Half wave rectifier (6.8)
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- Ripple factor (6.18)
- Comparison of rectifiers (6.19)
- Filter circuits (6.20)
- Types of Filter Circuits (6.21)
- Voltage stabilization (6.24)
- Zener diode as voltage stabilizer (6.27)
- Related Numericals.

Text books: Points 1 to 15 From

- Principles of Electronics By V.K.Mehta & Rohit Mehta, Publishers: S.Chand. 11th edition.

Reference Books :

- Electronic Devices and Circuits By S.Salivahanan & N.Suresh Kumar, Publishers: Mc Graw Hill Edu.Pvt.Ltd.4th edition.
- Modern Physics By R. Murugesan & Kiruthiga Sivaprasath, Publishers: S.Chand.

UNIT – III

❖ Transistor

[15 hours]

- Transistor (8.1, 8.2 & 8.3)
- Transistor action (8.4)
- Transistor symbols (8.5)
- Transistor connections (8.7)
- Common base connection (8.8)
- Characteristics of common base connection (8.9)
- Common emitter connection (8.10)
- Characteristics of common emitter connection (8.12)
- Transistor Biasing (9.2)
- Inherent Variations of Transistor Parameters (9.3)
- Stabilization (9.4)
- Stability Factor (9.6)
- Methods of Transistor Biasing
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Reference Books :

- Modern Physics By R. MURUGESHAN, KIRUTHIGA SIVAPRASATH, Publishers: S. Chand.
- Fundamentals of Electronics By D.C.Tayal, Praveen Tayal, Himalaya Publishing House.

Internal assessment

50 Marks

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
MDCPHY211(P)
(Physics Practical)

1 CREDIT (2 Hours/Week)

25 MARKS

Course Objectives and learning outcome

The course will provide the knowledge of different method for identifying different quantity of physics. Students will also acquire knowledge of multi-meter and galvanometer which is very essential part of physics.

On completion of the course, the students will be able to understand and evaluate:

- In depth knowledge of standing waves, experiment of resonator and deflection magnetometer.
- In electronics part, experiment of transformer, diode as rectifier and characteristics of transistor demonstrated.

With this practical knowledge student will understand the concept of physics and can design new circuits for applications.

Syllabus

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Practical 2: Study of Resonator.

Practical 3: Deflection Magnetometer.

Practical 4: Study of Transformer.

Practical 5: P - N Junction diode as Full Wave Rectifier.

Practical 6: Characteristics of Photo diode.

Practical 7: Characteristics of Common Base Transistor. (input & output)

Practical 8: Characteristics of Common Emitter Transistor. (input & output)

Practical 9: P - N Junction diode as Bridge Rectifier.

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
B. Sc. Semester – II
SECPHY211(P)
(Laboratory skills in physics)

2 CREDITS (4 Hours/Week)

50 MARKS

Course Objectives and learning outcome

The course will provide its learners a primary practical exposure to the physics laboratory skills in terms of handling of electronic and optical instruments, various types of hazards and its safety measures including first aid and disaster management.

- To Understand the basic principles, construction, working of various measuring instruments and their applications.
- To acquire the knowledge about the basic concepts Vernier calipers, Micrometer screw, Spherometer, Wheatstone Bridge etc.
- To understand working function of Wheatstone Bridge

At the end of course students will be able to

- Understands the basic knowledge about working of various instruments and their application.
- Learn and understand construction and use of various measuring instruments.

Syllabus

Unit-1	RESISTOR: General information, Resistor type, Wire wound resistor, Carbon composition resistor, Carbon film resistor, Cermet film resistor, Metal film resistor, Power resistor, Value tolerance, Variable resistor, Potentiometer and Rheostats, Fusible resistor, Resistor color, resistor, Colour band, Resistor under ten ohm, Resistor. Troubles, Checking resistor with ohmmeter. TRANSFORMER: Introduction, Type of Transformer, Construction of Transformer, Transformer working, Transformer impedance, Can a Transformer Operate on DC ?, RF Shielding, Auto Transformer.
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Unit-2	INDUCTOR: Inductor, Comparison of different coils, Inductance of an inductance, Another definition of inductance, Mutual inductance, Coefficient of coupling, Variables inductors, Inductor in series and parallel without M, Series combination with m, Stray inductance, Energy storage magnetic field, DC Resistance of coils CAPACITOR: Capacitors, Capacitor connect to battery, Capacitance, Factors controlling capacitance, Type of Capacitors, Fixed Capacitor, Variable capacitors, Voltage rating of capacitors, Stray circuit cap. Leakage resistance, Troubles Capacitor, Checking capacitor with ohm meter.
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Practical examination mark distribution:

- a) Perform practical and calculate parameter for given practical. **[25 marks]**
- b) viva/Demonstration of practical skills related to identification and handling of equipment and Explanation of practical assignment work undertaken. **[15 marks]**
- c) Continuous internal assessment may also include active participation in activities and demonstration of skill achievement **[10 marks]**

Bhakta Kavi Narsinh Mehta University, Junagadh

**Effective from June - 2023 Subject: All 3-Credit
course (NEP-2020) MAJPHY211,212,221,222,
MINPHY211,221, MDC211,221
(THEORY EXAM)**

PAPER STYLE

Total mark: 50

Time: 2 hours

All the questions are compulsory.

- | | |
|--|-------------|
| Q. 1 Answer any 2 out of 3 from following questions. [UNIT-I] | (10) |
| Q. 2 Answer any 2 out of 3 from following questions. [UNIT-II] | (10) |
| Q. 3 Answer any 2 out of 3 from following questions. [UNIT-III] | (10) |
| Q. 4 Answer any 5 out of 9 from following questions. [UNIT-I, II and III] | (10) |
| Q. 5 Answer any 2 out of 3 from following questions. [UNIT-I, II and III] | (10) |

EVALUATION OF 100 MARKS (4 CREDIT PAPER)

Continuous and Comprehensive Evaluation (CCE)-Formative-50 Marks		Semester End Evaluation (SEE)-Summative-50 Marks
Theory (25 Marks)	Practical (25 Marks)	1. Writing and Memory skill test
1. Test 15 Marks 2. Assignment 05 Marks 3. Attendance 05 Marks	1. Performance 15 Marks 2. Viva 10 Marks	
Total 25 Marks	Total 25 Marks	
		Total 50 Marks

Marks of practical and viva will be considered under CCE.