HEMCHNDRACHARYA NORTH GUJARAT UNIVERSITY
PATAN - 384 265

NAAC Accreditation Grade - " B "

FACULTY OF SCIENCE

B. Sc. - PHYSICS
New Syllabus and Exam Scheme

Semester - I TO II
With Semester / CBCS / Grading Pattern

W. E. F. June - 2011.

Date : 30 - 06 - 2011

TOTAL PAGE - 23

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY PATAN-384 265

NAAC 'B' (CGPA) Accredited (State University)

U.G. (B. Sc.) Programme

CBCS :: Semester :: Grading Pattern

With effect from: **June 2011**

Faculty

Science

Subject

Physics

B.Sc.

Semesters: I & II

Total Pages: **1 to 23**

Submitted on

Date: 30/06/2011

Choice Based Credit System-Semester-Grading System
In Under Graduate B Sc Programme

The 11th Five Year plan of India proposed various measures for academic reforms in higher education. Keeping in view the challenges of the changed times and make the higher education in Indian Universities compatible with the universities in developed nations, the UGC (11th Plan, March 2009) and later on the Association of Indian Universities (AIU) stressed on the following recommendations:

- ❖ Semester System
- ❖ Choice Based Credit System.
- ❖ Curriculum Development
- ❖ Examination Reforms
- ❖ Administrative Reforms

All the above recommendations for reforms have been reviewed in by representatives of various universities in the Gujarat State and considered for implementation with the aim of transforming Higher Education-a **transformation where students change from being passive recipients of knowledge to becoming active participants of the knowledge imbibing process.** The education system in the State thus changes from a teacher-centric to **learner-centric** mode. It should aim at all-round integral development of students' personality so that they become good citizens of t new world order.

Salient Features: CBCS in UG programme in Physics shall be offered from the **Academic year 2011-12**.

1. Physics subject in the Universities/Affiliated Colleges shall offer undergraduate programme in Faculty of Science from the Academic year 2011-12.

2. A student will have to get enrolled a **Core course** depending upon his/her requirement of a degree in the said discipline of study. A student will have a choice of selecting an **Elective** as well as **Foundation** courses from a pool of courses.

3. Each course shall be assigned a specific number of **Credits**.

4. A Core course is the course which should compulsorily be studied by a candidate as a Core requirement so as to get degree in a said discipline of study.

5. There shall be three **Core Compulsory** courses (Theory) each with **4 credits** and their practical's each with **2 credits**. Thus, a credit weight-age in Sem-I&II of **B Sc** programme for each core course shall be of **6 credits**. In short, 6 credits multiplied by 3 core compulsory courses equal to total of **18 credits**.

6. In addition to the Core courses, a student will have to choose Elective as well as Foundation courses from a pool of courses.

7. **Two** courses of **Elective**, one each from **Generic Elective** and Interdisciplinary / Multidisciplinary / **Subject centric electives** shall have to be offered. The credit weight-age for each Elective course shall be of **02 Credits**. Hence, a total credit weight-age for Elective courses shall be of **4 credits**.

8. One **Foundation** (English Language) course shall have to be offered. The credit weight-age for Foundation course shall be of **02 credits**.

Each course shall have a unique Course code. The Core courses, Elective courses and the Foundation courses shall be abbreviated respectively as **CC, PC, EG, ES and FC**.

1. Core Compulsory **CC**
   Practical Core (Core Elective) **PC**
2. Elective Generic **EG**
   Elective Subject **ES**
3. Foundation Compulsory **FC**

Each Academic year shall consist of **two** semesters, each of **15 weeks** of teaching equivalent to 90 working days. The Odd semester period shall be from **July to November** and the Even semester period shall be from **December to April**.

The course with **4 credits** shall be of **60 hrs** (15 weeks x 4 credits) duration. The course with **3 credits** shall be of **45 hrs** (15 weeks x 3 credits) duration. The course with **2 credits** shall be of **30 hrs** (15 weeks x 2 credits) duration.

A general framework for Bachelor of Science (B Sc) programme shall be as follows:

Semester wise credits						Total credits of the Programme
I	II	III	IV	V	VI	
24	24	24	24	24	24	144

The semester wise weightage of core, elective and foundation courses shall be as follows:

Academic Year	Core compulsory courses	Elective courses	Foundation courses
Semester I & II	65-75%	15-20%	10-15%
Semester III & IV	65-75%	15-20%	10-15%
Semester V & VI	65-75%	15-20%	10-15%

Attendance:

The Attendance Rules as per the norms of Hemchandracharya North Gujarat University.

Medium of Instruction:

The Medium of Instruction shall be of **Gujarati medium**. Student is free to write answers either in **Gujarati** or **English** language.

Language of Question paper:

Question paper should be drawn in **Gujarati** language and its **English** version should be given.

Evaluation Methods:

1. A student shall be evaluated through Comprehensive Continuous Assessment (CCA)/ (**Internal Evaluation**) as well as the **End of Semester examination (External Evaluation**). The weight-age of CCA shall be 30%, where as the weight-age of the Semester end examination shall be 70%. There will be **no internal evaluation in practical courses** as well as in **elective courses**.

2. The Semester assessment (CCA)/ (**Internal Evaluation**) is spread through the duration of the course and is to be done by the Teacher teaching the course. The assessment is to be done by various means including:

   ✓ MCQs based Tests/Quiz - 15Marks
   ✓ Two Assignments - 10Marks
   ✓ Attendance - 05Marks

The performance of student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points. Evaluation for each course shall be done by continuous internal assessment as well as semester end exam and will be consolidated at the end of the course.

3. The **End of Semester examination (External Evaluation**) shall have an assessment based upon following perspective with respect to all the courses:

   ✓ Evaluation with respect to Knowledge
   ✓ Evaluation with respect to Understanding

- ✓ Evaluation with respect to Skill
- ✓ Evaluation with respect to Application
- ✓ Higher Order Thinking Skills

4. With respect to all the above components, there shall be following types of Questions from each unit of the course.

   - ✓ MCQs/Fill in the blanks/ Match the pairs, etc
   - ✓ Short answer questions
   - ✓ Medium answer questions
   - ✓ Long answer questions
   - ✓ Examples/ Problems, etc

5. The End of Semester Examination will be conducted by the University. A certified journal of the respective core compulsory course shall be produced at the time of practical examination.

6. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for each course shall be **40%**, or as decided by concern Board of Studies of the Subject.

7. Promotion, Re-Admission and Time for Completion of Course, Procedure for Awarding Grade, Provision for Appeal, etc. as decided by the Hemchandracharya North Gujarat University.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.Sc. Programme with 144 credits

CBCS-Semester-Grading Pattern

w.e.f. June-2011

General Pattern/Scheme of study components along with credits for Science faculty.

Part/Class	Subject code	Study Components	Instruction Hrs/ Week	Examination Internal	Examination Uni. Exam	Examination Total	Credit
		Semester-I					
		Core Compulsory (CC) Course					
	CC-I-1	Core Course-I (Paper-1)	4	30	70	100	4
	CC-II-1	Core Course-II (Paper-1)	4	30	70	100	4
	CC-III-1	Core Course-III (Paper-1)	4	30	70	100	4
		Practical Core (PC) Course					
	PC-I-1	Practical Core Course-I (Paper-1)	4		50	50	2
Sem –I B.Sc.	PC-II-1	Practical Core Course-II (Paper-1)	4		50	50	2
	PC-III-1	Practical Core Course-III (Paper-1)	4		50	50	2
		Foundation Course (FC)					
	FC-1	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EG-1	Elective (**Generic**) Course –I	2		50	50	2
	ES-1	Elective (**Subject**) Course –I	2		50	50	2
			30	105	495	600	24
		Semester-II					
		Core Compulsory (CC)Course					
	CC-I-2	Core Course-I (Paper-1)	4	30	70	100	4
	CC-II-2	Core Course-II (Paper-1)	4	30	70	100	4
	CC-III-2	Core Course-III (Paper-1)	4	30	70	100	4
		Practical Core (PC) Course					
Sem-II B.Sc.	PC-I-2	Practical Core Course-I (Paper-1)	4		50	50	2
	PC-II-2	Practical Core Course-II (Paper-1)	4		50	50	2
	PC-III-2	Practical Core Course-III (Paper-1)	4		50	50	2
		Foundation Course (FC)					
	FC-2	Foundation (Compulsory) course (Generic) - English (L.L.)	2	15	35	50	2
		Elective Course (E)					
	EG-2	Elective (**Generic**) Course -II	2		50	50	2
	ES-2	Elective (**Subject**) Course –II	2		50	50	2
			30	105	495	600	24

Hemchandracharya North Gujarat University, Patan
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester end Examination
Format for Question paper **Elective Courses (Subject) in Physics**

Time: 2Hrs   Total Marks: 50

Part A
(Answer all questions)

1-5.   Questions such as, MCQs, Fill in the blanks, Match the pairs, etc.   05

    (Each of 1 Mark) [At least **two** questions from each Unit]

Part B
(Answer all questions)

6-10.   Very short answer type questions such as, Definition, Explain the terms, Functions, Principles,

    etc. (Each of 1 Mark) [At least **two** questions from each Unit]   05

Part C
(Answer any five/seven of the following)

11-17.   Short answer type questions such as, Definition, Explain the terms, examples, reasons, figures

    differences, etc. (Each of 2 Marks) [At least **three** questions from each Unit]   10

Part D
(Answer any three/five of the following)

18-22.   Medium answer type questions such as, Short notes, diagrams, examples, reasons, differences,

    etc (Each of 4 Marks) [At least **two** question from each Unit]   12

Part E
(Answer any three/five of the following)

23-27.   Long answer type questions such as, Describe / Discuss in detail, diagrams, examples, etc   18

    (Each of 6 Marks) [At least **two** question from each Unit]

Hemchandracharya North Gujarat University, Patan
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester end Examination
Format for Question paper **Core Complementary Courses in Physics**

Structure of the Paper in Examination

There will be five questions each of 14 marks. First question will be from Unit - I, Second question from Unit-II, Third question from Unit-III, Forth question from Unit-IV and Fifth question will be from all four Units. All the questions are detailed as under. (**Total 70 Marks and 3 Hours time for the Paper**)

1 (a) Answer the following (Any one out of two **OR** two out of three)   08 Marks
       (Theory questions)

   (b) Attempt any three of following (Out of five)   03 Marks
       (M.C.Q. Type)

   (c) Attempt any one (Out of two)   03 Marks
       (Application/Example/Problem)

2 (a) Answer the following (Any one out of two **OR** two out of three)   08 Marks
       (Theory questions)

   (b) Attempt any three of following (Out of five)   03 Marks
       (M.C.Q. Type)

   (c) Attempt any one (Out of two)   03 Marks
       (Application/Example/Problem)

3 (a) Answer the following (Any one out of two **OR** two out of three)   08 Marks
       (Theory questions)

   (b) Attempt any three of following (Out of five)   03 Marks
       (M.C.Q. Type)

   (c) Attempt any one (Out of two)   03 Marks
       (Application/Example/Problem)

4 (a) Answer the following (Any one out of two **OR** two out of three)   08 Marks
       (Theory questions)

   (b) Attempt any three of following (Out of five)   03 Marks
       (M.C.Q. Type)

   (c) Attempt any one (Out of two)   03 Marks
       (Application/Example/Problem)

5 Answer the following (Any seven out of ten)   14 Marks

   (Short answer or objective type questions)

Unit – I

(a) Vector analysis:

Triple Products of Vectors (2.20), Scalar Triple Product (2.21), Some Important Conclusions from Scalar Triple Product (2.22), The Vector Triple Product

A X (B X C) (2.23), Differentiation of a Vector with Respect to time (3.1), Scalar and Vector Fields (3.3), Partial Differentiation and Gradient (3.4), Operations with ∇ (3.5), The rate of Flow of flux of a Vector Field (3.8), Vector Integration (3.9), Surface Integral (3.12), Gauss's Divergence Theorem (3.13), Stoke's Theorem (3.14), Derivation of Green's Theorem from Gauss Divergence theorem (3.18)

Basic reference:

Electricity and Magnetism By K.K. Tewari (S.Chand & Company Ltd.)

(b) Simple Harmonic Motion and Damped Vibration

Composition of Two Simple Harmonic Motions along the same direction of the same frequency (2.8), Composition of two simple harmonic motions acting upon a particle simultaneously at right angles to each other, same time period but different in phase (2.10), Motion in a resisting medium (3.5).

Basic reference:

A Textbook on Oscillations, Waves and Acoustics - By M.Ghosh & D.Bhattacharya, (S.Chand & Company Ltd.)

Other reference:

1.Mathematical methods in physical sciences By M.L.Boas (John Willey & Sons)

2.Waves And Oscillations By N.Subrahmanyam & Brij Lal

(Vikas Publishing House Pvt Ltd., New Delhi)

Unit – II

(a) D.C. Circuits:

Simple R-L Circuit - Growth and Decay of Current Helmholtz equitation (11.24), R-C Circuit (11.25), Measurement of high resistance by method of leakage (11.26), Comparison of capacities by De Sauty's Method (11.27), Ideal L-C. Circuit (11.28), Series LCR Circuit (Charge case only) (11.29),

(b) Network Theorems:

Superposition Theorem (18.5), Thevenin's Theorem (18.6), Norton's Theorem (18.7), Maximum Power Theorem (18.8)

Basic reference: For (a) & (b)

Electricity and Magnetism By K.K.Tewari (S.Chand & Company Ltd.)

Other reference:

1.Electrical Circuit Analysis By Sony and Gupta

2.Network Analysis By G.K.Mittal (Khanna Publications)

3.Electricity and Magnetism By D.C. Tayal

Unit – III

(a) Heat and Thermodynamics:

Second Law of Thermodynamics (2.8), Carnot's Theorem (2.9), Thermodynamic Scale of Temperature (2.10), Identity of Perfect Gas Scale and Absolute Scale (2.11), Thermodynamics of Refrigeration (4.2)

(b) Entropy:

Entropy (2.13), Change of Entropy in a Reversible process (2.14), Change of Entropy in an Irreversible process (2.15), Principle of increase of entropy or degradation of energy (2.16), Formulation of the second law in terms of entropy (2.17), Entropy and Second Law (2.18)

Basic reference: For (a)& (b)

Thermodynamics and statistical Physics By Singhal, Agarwal and Prakash (Pragati Prakashan, Meerut)

Other reference:

1.Heat and Thermodynamics By Zeemansky

2.University Physics By Sears, Zeemansky and Young

   (Narosa Publishing House)

3.Heat and Thermodynamics By Richard H.Dittmon, &

   Mark W.Zemansky (TMH)

4.Heat and Thermodynamics By A.B.Gupta and H.P.Roy (New Central Book)

Unit – IV

(a) Rectifier and filter circuits:

The Half Wave Rectifier (2.2),Voltage regulation (2.3),Ripple factor(2.4) Ratio of Rectifications (2.5),Transformer utilization factor (2.6),The Full Wave Rectifier (2.8),The Bridge Rectifier (2.9),The Inductor filter (3.1),The Capacitor filter (3.3),Ripple factor (3.4),The Choke input filter (3.9),Ripple factor in LC filter (3.10),Value of Critical inductance (3.11),The CLC filter (3.13)

Basic reference:

Electronic Devices & Circuits by Allen Mottershead (PHI Pvt.Ltd)

(b) Transistors:

(Review of Construction of transistor)

Transistor current components (4.18), Detailed Transistor Leakage currents (4.18-1), C-B Configuration static characteristics (4.19-1),Load line (4.21),Operating point (4.22)

Basic reference:

Hand Book of Electronics by Gupta & Kumar (Pragati Prakashan, Meerut-Revised addition)

Other reference:

1.Electronics and Radio Engineering by M.L.Gupta.

2.Basic Electronis and Linear circuits by Bhargva Kulshreshth & Gupta

· TMH Edition

3.Elements of Electronics by Bagde & Singh.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

B.Sc.Semester-I

PC:PHY-102

LABORATORY EXPERIMENTS FOR PHYSICS

GROUP – I

1. Damping coefficient, Relaxation and quality factor in the damped motion of a simple Pendulum.

2. M.I. of a Fly wheel.

3. Verification of Steafan's law using A.C.Source.

4. Arrangement of Spectrometer for parallel rays using Schuster method and clibration of spectrometer.

5. Refractive index of liquid using convex lens.

6. Study of Resonator.

7. To determine the magnetic moment of a given Bar magnet using deflection magnetometer in Gauss A and B position.

GROUP – II

1. Determination of the capacity 'c' of condenser.
2. Study of the series resonance with frequency variation.
3. Decay of Potential across condenser.
4. P-N Junction diode as <u>Half</u> Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.
5. V-I characteristics of Zener diode and its use as Voltage regulator.
6. Verification of Thevenin's theorem.
7. Characteristics of common Emitter Transistor.

= * = * = * =

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-II
CC PHY-103
(in force from June 2011)

Unit – I

(a) Mechanics of a single particle & of particles:

Motion of a particle subjected to a resistive force 3.3(d) [1 to 5], mechanics of a system of particle(3.5), Motion of a system with variable mass(3.6)

(b) Motion in a central force field & Pendulum:

(i) Equivalent one body problem(5.1), Motion in central force field(5.2) General features of the motion(5.3), Motion in a inverse square law force field (5.4) Equation of the orbit(5.5). Kapler's law of planetary motion (5.6)

(ii) Compound Pendulum (6.4), Bar-Pendulum (6.9)

Basic reference: For (a) & (b)(i)

Introduction To Classical Mechanics By R.G. Takwale & P.S.Puranik (Tata McGraw-Hill Publishing Company Ltd.)

Basic reference: For (b)(ii)

Elements of Properties of Matter By D.S.Mathur (S.Chand & Company Ltd.)

Other reference:

1.Mechanics & Electrodynamics By Brij lal, N.Subrahmanyam & Jivan

Seshan –(S.Chand & Co.)

2.Classical Mechanics by Goldstain (Narosa Pub.)

Unit – II

(a) Refraction Through Lenses:

Principal Foci (2.3), Least possible distance between an object & its real image in a convex lens(2.4), Derivation produced by a thin lans(2.5), Equivalent Focal Length of Two Thin Lenses Separated by a Finite Distance (2.6), Cardinal Points of an Optical system (2.8), Principal Foci and Focal Planes (2.9), Principal Points and Principal Planes (2.10), Nodal Points (2.11) Aberrations(3.1),Spherical aberration in a Lens (3.5),Chromatic aberration (3.12).

(b) Interference:

Interference in thin films (8.15), Interference due to reflected light (8.16), Interference due to transmitted light (8.17), Newton's Rings (8.23), Determination the wavelength of sodium light using Newton's Rings (8.24), Refractive Index of a Liquid using Newtons's Rings (8.25)

Basic reference: For (a) & (b)

A Textbook of OPTICS By N.Subrahmanyam & Brij Lal (S.Chand & Company Ltd.)

Other reference:

1.Optics and Atomic Physics By D.P.Khandelval (Himalaya publishing house)

2.Principles of Optics By B.K.Mathur (S.Chand & Company Ltd.)

3.Optics By Ajoy Ghatak (TMH Edition)

Unit – III

(a) Electrostatics:

Gauss's Law (4.21), Gauss's Law in Differential Form (4.22), Gauss's Law and Coulomb's Law (4.23), Force on The surface of a charged Conductor (4.25), Electrostatic Energy in the medium surrounding the charged conductor (4.26), Millikan's Oil drop Method for Determination of Electronic charge (4.29),

(b) Steady Current:

Current and current density (8.6), Conservation of Charge i.e., Continuity Equation (8.8), Ohm's Law at a Point (8.11), Wiedmann and Franz Law (8.13), The Relaxation Time (8.14).

Basic reference: For (a) & (b)

Electricity and Magnetism By K.K.Tewari (S.Chand & Company Ltd.)

Other reference:

1.Electricity and Magnetism by Mahajan and Rangwala.

2.Electricity and Magnetism - Berkley Physics Course Vol-II

Unit – IV

(a) Waves:

Theory of Resonator (6.16), Dependence of the Frequency of Resonator on the size and the Shape of the Mouth (6.17), Velocity of Transverse Waves along a Stretched String (7.1), Laws of Transverse Vibration of Strings (7.3), Melde's Experiment (7.5), Kundt's Tube (7.13)

(b) Ultrasonic waves:

Ultrasonics (11.23), Production of Ultrasonic Waves (11.24), Piezo-Electric Oscillator (11.24.3), Detection of Ultrasonic Waves (11.25), Applications of Ultrasonic waves (11.27)

Basic reference: For (a) & (b)

Waves and Oscillations By N.Subrahmanyam and Brij Lal (Vikas Publishing House Pvt. Ltd., New Delhi) – Second Revised Edition.

Other reference:

1.University Physics By Sears, Zeemansky and Young

(Narosa Publishing House)

2.A Text Book on Ocillations, Waves and Acoustics By M.Ghosh &

D.Bhattacharya (S.Chand)

3.Vibration, Waves & Heat By Sears and Zeemansky

LABORATORY EXPERIMENTS

GROUP – I

1. Bar Pendulum : Determination of 'K' and 'g'

2. Double Refraction by Calcite prism.

3. Newton's rings : Determination of R and λ using sodium light.

4. Melde's Experiment.

5. Find out Refractive index of prism using spectrometer.

6. Study of line spectra.

7. To determine the ratio of magnetic moments of two magnets by using vibrational magnetometer.

GROUP – II

1. Determination of self inductance 'L' of Inductor.

2. Study of parallel resonance with frequency variation.

3. Study of transformer.

4. P-N Junction diode as <u>Full</u> Wave Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.

5. Bridge Rectifier (i) Without filter (ii) With Series inductor Filter (iii) With Shunt Capacitor Filter. Calculation of percentage of regulation.

6. Verification of Maximum power transfer theorem.

7. Basic Logic Gates AND , OR , NOT

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
List of Elective (Subject) Courses For Physics
(in force from June 2011)
Credits-2

Elementary Mechanics

Oscillations and Waves

Mathematical Methods in Physics-I

Mathematical Methods in Physics-II

Thermodynamics and Statistical Mechanics

Electric and Magnetic Phenomena

Optics
NANO TECHNOLOGY
Nuclear Energy
ENERGY PHYSICS
LASER
Instrumentation Measurement and analysis
Climate Change

Electrical Circuits and Electronics

Modern Physics

Physics of Solids

Mathematical Methods in Physics-III

Astronomy and Astrophysics

Communication Physics

HEMCHANDRACHARYANORTH GUJARAT UNIVERSITY, PATAN
PHYSICS: SEMESTER-I of B.Sc.

Core Elective

NANO TECHNOLOGY

UNIT-I

INTRODUCTION: Pre- Nanotechnology, Origins of Concepts of Nano, Advances in Experimental Methods, Nanotechnology-Basics and Basis, Size of Nano, The Meaning of Nanotechnology, Four Generations of Nanotechnology Development, Technology of General Applicability, Multi-purpose Technology, Applications of Nanotechnology.

NANOCHEMISTRY: Introduction, Basic Concepts, Classification of Nanomaterials, Techniques of Production or Methodology, Size Concerns.

Fullerenes: Introduction, History of Discovery, Variations, Properties of Fullerenes.

UNIT-II

Carbon Nanotube: Introduction, Discovery, Description, 'Types of Carbon Nanotubes and Related Structures, Single-walled Nanotubes, Multi-walled Nanotubes, Introduction, Structure, Research, Self-assembled Monolayars, Applications.

NANOPHYSICS: Quantum Dot, Description, Quantum Confinement in Semiconductors, Optical Properties, Fabrication, Mass Production, Applications, Computing Field ,Biology, Cellular Imaging, Quantum Dots tor Thmour Thrgeting, Toxicity, Photovoltaic Devices, Light-emitting Devices, Quantum Wire, Carbon Nanotubes as Quantum Wires, Quantum Well, Fabrication, Applications, Quantum Point Contact, Fabrication, Properties, Applications. Nanocrystals, Nanocrystal solar cell.

References:
(1) Nanotechnology by S.Shanmugam, MJP Publishers
(2) Nanobiotechnology by Subbiah Balaji, MJP Publishers
(3) Nanoscience and Technology by V S Muralidharan, A subramania, Ane Books
   Pvt Ltd

Core Elective

Nuclear Energy

Unit-1

Mechanism of Nuclear Fission, Fission Cross sections, Fission reactors, Fission Rate & reactor Power, Fission neutrons and gamma rays, prompt neutrons, delayed neutrons, fission gamma rays, Fission products, Amounts and activities of fission products, Fission–product activity after shutdown, Heat generation after shutdown

Unit-2

Nuclear Fusion – Thermonuclear reactions – Energy production in stars.
Fundamental interactions & elementary particles, Strong, Weak & Electromagnetic interactions.

Books:

• Nuclear Physics : Theory and Experiments, R. Roy and B.P. Nigam, Wiley Eastern.
• Physics of Nuclei and Particles, P. Marmier and E. Sheldon, Vol.1, Academic Press Physics of the Nucleus, M.A. Preston Addision Wesle

Core Elective

ENERGY PHYSICS

UNIT-I: Conventional Energy Sources

World's reserve: commercial energy sources and their availability – various forms of energy-renewable and conventional energy system-comparison-Coal, Oil and natural gas- applications – Merits and Demerits.

UNIT –II: Solar Energy

Renewable energy sources-solar energy-nature and solar radiation-components- solar heaters-crop dryers-solar cookers-water desalination (block diagram) Photovlotaic generation-merits and demerits

Books for Study:

"Renewable energy sources and emerging Technologies", by D.P. Kothari, K.C. Singal & Rakesh Ranjan, Prentice Hall of India pvt. Ltd., New Delhi(2008)

Books for Reference:

"Renewable energy sources and their environmental impact"- S.A. Abbasi and Nasema Abbasi PHI Learning Pvt. Ltd., New Delhi(2008)

HEMCHANDRACHARYANORTH GUJARAT UNIVERSITY, PATAN
PHYSICS: SEMESTER-I of B.Sc.

Core Elective

LASER

UNIT-I: Fundamentals of LASER

Spontaneous emission-stimulated emission-meta stable state- Population inversion-pumping – Laser Characteristics.

UNIT-II: Production of LASER

Helium-Neon Laser-Ruby Laser-CO_2 Laser- Semiconductor Laser, Laser for cutting, welding & drilling.

Book for Study:

An introduction to LASERS- N. Avadhanulu, S. Chand & Company (2001)

Books for Reference:

1. Laser Fundamentals- William T. Silfvast Cambridge University Press- Published in South Asia by foundation books,23, Ansari Road, New Delhi

2. LASER Theory and Application- K. Thyagrajan and A.K. Ghatak, Mac millan, India Ltd.

HEMCHANDRACHARYANORTH GUJARAT UNIVERSITY, PATAN
PHYSICS: SEMESTER-I of B.Sc.

Core Elective

Instrumentation Measurement and analysis

UNIT-I:

Vernier Calipers: Introduction, Theory, Figure, Description of the instrument, Detail study of Least count, Errors, Positive error, negative error, Determination of magnitude of positive and negative errors.

Micrometer Screw: Introduction, Theory, Figure, Description of the instrument, Definition of pitch and its determination, study of least count, Meaning of the error and explanation of positive and negative errors. Determination of positive and negative errors. Method of taking observation with the help of Micrometer Screw.

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.

UNIT-II

Wheastone 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.

Construction of Galvanometer: Introduction, Theory, Sensitivity and Figure of Merit of Galvanometer.

Spectrometer: Introduction, Construction and explanation of three main parts of Spectrometer, Mercury Discharge lamp, Sodium Discharge lamp, The adjustment, leveling and the method of recording the observation of Spectrometer.

Book for Study: Experimental Book for Physics.

HEMCHANDRACHARYANORTH GUJARAT UNIVERSITY, PATAN
PHYSICS: SEMESTER-I of B.Sc.

Core Elective

Climate Change

UNIT-1: Global Warming and Greenhouse Effect

1. Introduction,
2. Greenhouse Gases and Global Climate Changes
3. Global Warming Potential
4. Possible Impact of Warming
5. Greenhouse Effect-Policy Response,

UNIT-2: Global Ozone Problem:

1. Ozone in the Atmosphere
2. Ozone Depletion Process
3. Ozone Hole
4. The Montreal Protocol
5. Consequences of Ozone Depletion,

Book for Study:

Chapter 16 & 17 of Environment Science by SC Santra, New Central Book Agency(P) Ltd.Kolkata, India

હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, પાટણ

યુનિવર્સિટી રોડ, પો. બો. નં.–૨૧, **પાટણ**.–૩૮૪ ૨૬૫. (ઉ. ગુ.) ફોન નં.–(૦૨૭૬૬) ૨૨૦ ૭૩૨.

પરિપત્ર ક્રમાંક – **૧૯૮** /૨૦૧૩

વિષય:– **બી.એસસી.–ફિઝીકસ** ના સેમેસ્ટર–૩ અને ૪ ના સુધારેલ અભ્યાસક્રમ/ સ્કીમ અંગે..

આ યુનિવર્સિટી સંલગ્ન સાયંસ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, આ યુનિવર્સિટીની ફિઝીકસ વિષયની અભ્યાસ સમિતિની તારીખ: ૧૧ / ૦૯ / ૨૦૧૩ ની સભાએ ભલામણ કર્યાનુસાર **બી.એસસી.–ફિઝીકસ**નો સેમેસ્ટર/ સીબીસીએસ/ ગ્રેડીંગ પેટર્નનો સામેલ પરિશિષ્ટ પ્રમાણેનો સેમેસ્ટર–૩ અને ૪ નો સુધારેલ (Revised) અભ્યાસક્રમ/ સ્કીમ જૂન–૨૦૧૩ થી અમલમાં આવે તે રીતે માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેનો અમલ થવા સારુ સબંધિતોને આથી જાણ કરવામાં આવે છે.

આ બાબતની અધ્યાપકશ્રીઓ તથા વિદ્યાર્થીઓને આપના સ્તરેથી જાણ કરવા વિનંતી છે.

નોંધ : (૧) વિદ્યાર્થીઓની જરૂરીયાત માટે અભ્યાસક્રમની એક નકલ કોલેજના ગ્રંથાલયમાં મૂકવાની રહેશે.

(૨) આ અભ્યાસક્રમ યુનિવર્સિટીની વેબસાઈટ www.ngu.ac.in પર પણ ઉપલબ્ધ કરવામાં આવનાર છે.

કુલસચિવવતી

બિડાણ : ઉપર મુજબ

નં.–એ કે / અ × સ /   /૨૦૧૩
તારીખ :   ૧ / ૦૯ / ૨૦૧૩

પ્રતિ,

૧. સંલગ્ન સાયંસ કોલેજોના આચાર્યશ્રીઓ.

૨. ડૉ. એમ.બી. પ્રજાપતિ (ડીનશ્રી – **વિજ્ઞાન વિદ્યાશાખા**), મેથેમેટીકસ ડીપાર્ટમેન્ટ, હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.

૩. પરીક્ષા નિયામકશ્રી, હેમચંદ્રાચાર્ય ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.   (પાંચ નકલ)

૪. ગ્રંથપાલશ્રી, હેમ. ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.   (વિદ્યાર્થીઓના ઉપયોગ સારુ રેકર્ડ ફાઈલ માટે)

૫. સિસ્ટમ એનાલિસ્ટશ્રી, કોમ્પ્યુટર (રીઝલ્ટ) સેન્ટર, હેમ.ઉ.ગુ.યુનિવર્સિટી, **પાટણ**. તરફ પરિણામ માટે તથા વેબ સાઈટ પર મૂકવા સારુ.

૬. માન.કુલપતિશ્રી /કુલસચિવશ્રીનું કાર્યાલય, હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.

૭. પ્રવેશ પ્રશાખા (એકેડેમિક), હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.

૮. મહેકમ શાખા, હેમ.ઉત્તર ગુજરાત યુનિવર્સિટી, **પાટણ**.   તરફ ⇨ પરિપત્રની ફાઈલ અર્થે.

૯. સબંધિત ફાઈલે.

૧૦.સિલેકટ ફાઈલે. –

HEMCHNDRACHARYA NORTH GUJARAT UNIVERSITY
PATAN - 384 265

FACULTY OF SCIENCE

B. Sc. - PHYSICS

SEMESTER – III & IV

Revised Syllabus / Scheme

WITH SEMESTER/ CBCS/ GRADING PATTERN

W. E. F. : June - 2013

DATE : 11–09–2013

TOTAL PAGE – 23

HEMCHANDRACHARYA
NORTH GUJARAT UNIVERSITY
PATAN-384 265

NAAC'B' (CGPA) Accredited (State University)

U.G. (B. Sc.) Programme

CBCS :: Semester :: Grading Pattern

With effect from: June 2013 (In Continuation)

Faculty

Science

Subject

PHYSICS

REVISED SYLLABUS/SCHEME

B.Sc. Semesters- III & IV

Total Pages: **1 to 23**

Choice Based Credit System-Semester-Grading System
In Under Graduate B Sc Programme

The 11th Five Year plan of India proposed various measures for academic reforms in higher education. Keeping in view the challenges of the changed times and make the higher education in Indian Universities compatible with the universities in developed nations, the UGC (11th Plan, March 2009) and later on the Association of Indian Universities (AIU) stressed on the following recommendations:

- ❖ Semester System
- ❖ Choice Based Credit System.
- ❖ Curriculum Development
- ❖ Examination Reforms
- ❖ Administrative Reforms

All the above recommendations for reforms have been reviewed in by representatives of various universities in the Gujarat State and considered for implementation with the aim of transforming Higher Education-a transformation **where students change from being passive recipients of knowledge to becoming active participants of the knowledge imbibing process.** The education system in the State thus changes from a teacher-centric to **learner-centric** mode. It should aim at all-round integral development of students' personality so that they become good citizens of the new world order.

Salient Features of CBCS in UG programme:

1. Physics subject in the Universities/Affiliated Colleges shall offer undergraduate programme in Faculty of Science from the Academic year 2011-12.

2. A student will have to get enrolled a **Core course** depending upon his/her requirement of a degree in the said discipline of study. A student will have a choice of selecting an **Elective** as well as **Foundation** courses from a pool of courses.

3. Each course shall be assigned a specific number of **Credits**.

4. A Core course is the course which should compulsorily be studied by a candidate as a Core requirement so as to get degree in a said discipline of study.

5. There shall be four **Core Compulsory** courses (Theory) each with **3 credits** and their practical's each with **1.5 credits**. Thus, a credit weight-age in Sem-III&IV of **B Sc** programme for each core course shall be of **4.5 credits**. In short, 4.5 credits multiplied by 4 core compulsory courses equal to total of **18 credits**.

6. In addition to the Core courses, a student will have to choose Elective as well as Foundation courses from a pool of courses.

7. **Two** courses of **Elective**, one each from **Generic Elective** and Interdisciplinary / Multidisciplinary / **Subject centric electives** shall have to be offered. The credit weight-age for each Elective course shall be of **02 Credits**. Hence, a total credit weight-age for Elective courses shall be of **4 credits**.

8. One **Foundation** (English Language) course shall have to be offered. The credit weight-age for Foundation course shall be of **02 credits**.

Each course shall have a unique Course code. The Core courses, Elective courses and the Foundation courses shall be abbreviated respectively as **CC, PC, EG, ES and FC.**

1. Core Compulsory -**CC**
   Practical Core -**PC**
2. Elective Generic - **EG**
   Elective Subject - **ES**
3. Foundation Compulsory- **FC**

Each Academic year shall consist of **two** semesters, each of **15 weeks** of teaching equivalent to 90 working days. The Odd semester period shall be from **July to November** and the Even semester period shall be from **December to April**.

The course with **4 credits** shall be of **60 hrs** (15 weeks x 4 credits) duration. The course with **3 credits** shall be of **45 hrs** (15 weeks x 3 credits) duration. The course with **2 credits** shall be of **30 hrs** (15 weeks x 2 credits) duration.

A general framework for Bachelor of Science (B Sc) programme shall be as follows:

Semester wise credits						Total credits of the Programme
I	II	III	IV	V	VI	
24	24	24	24	24	24	144

The semester wise weightage of core, elective and foundation courses shall be as follows:

Academic Year	Core compulsory Courses	Elective courses	Foundation courses
Semester I & II	65-75%	15-20%	10-15%
Semester III & IV	65-75%	15-20%	10-15%
Semester V & VI	65-75%	15-20%	10-15%

Attendance:

The Attendance Rules as per the norms of Hemchandracharya North Gujarat University.

Medium of Instruction:

The Medium of Instruction shall be of **Gujarati medium**. Student is free to write answers either in **Gujarati** or **English** language.

Language of Question paper:

Question paper should be drawn in **Gujarati** language and its **English** version should be given.

Evaluation Methods:

1. A student shall be evaluated through Comprehensive Continuous Assessment (CCA)/ (Internal Evaluation) as well as the **End of Semester examination (External Evaluation)**. The weight-age of CCA shall be 30%, where as the weight-age of the Semester end examination shall be 70%. There will be **no internal evaluation in practical courses** as well as in **elective courses**.

2. The Semester assessment (CCA)/ (Internal Evaluation) is spread through the duration of the course and is to be done by the Teacher teaching the course. The assessment is to be done by various means including:

   ✓ Internal Test - 20Marks
   ✓ Assignments - 05Marks
   ✓ Attendance - 05Marks

The performance of student in each course is evaluated in terms of percentage of marks with a provision for conversion to grade points. Evaluation for each course shall be done by continuous internal assessment as well as semester end exam and will be consolidated at the end of the course.

3. The **End of Semester examination (External Evaluation)** shall have an assessment based upon following perspective with respect to all the courses:

- ✓ Evaluation with respect to Knowledge
- ✓ Evaluation with respect to Understanding
- ✓ Evaluation with respect to Skill
- ✓ Evaluation with respect to Application
- ✓ Higher Order Thinking Skills

4. With respect to all the above components, there shall be following types of Questions from each unit of the course.

- ✓ MCQs/Fill in the blanks/ Match the pairs, etc
- ✓ Short answer questions
- ✓ Medium answer questions
- ✓ Long answer questions
- ✓ Examples/ Problems, etc

5. The End of Semester Examination (Theory) will be conducted by the University. A certified journal of the respective core compulsory course shall be produced at the time of practical examination. In Practical Exam there will be two practicals (each from PC-301 & PC-302) each of 50 marks (35-marks for practical+15marks for Viva) and duration of each practical will be 4 hours (3 hours for Practical+ 1 hour for Viva). Numbers of student in a practical exam will be20 to 24 and examiners will be 2.

6. It will be compulsory for a candidate to obtain passing percentage in both Internal as well as External Evaluation. The passing marks for each course shall be **40%**, or as decided by concern Board of Studies of the Subject.

7. Promotion, Re-Admission and Time for Completion of Course, Procedure for Awarding Grades, Provision for Appeal, etc. as decided by the Hemchandracharya North Gujarat University.

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
B.Sc. Programme with 144 credits
CBCS-Semester-Grading Pattern
w.e.f. June-2011

General Pattern/Scheme of study components along with credits for Science faculty.

Part/Class	Course	Study Components	Instruction Hrs/ Week	Internal	Uni. Exam	Total	Credit
		Semester-III					
		Core Compulsory (CC) Course					
	CC-I-3	Core Course-I (Paper-3)	3	30	70	100	3
	CC-I-4	Core Course-I (Paper-4)	3	30	70	100	3
	CC-II-3	Core Course-II (Paper-3)	3	30	70	100	3
	CC-II-4	Core Course-II (Paper-4)	3	30	70	100	3
		Practical Core (PC) Course					
	PC-I-3	Practical Core Course-I (Paper-3)	3		50	50	1.5
B. Sc. Sem –III	PC-I-4.	Practical Core Course-I (Paper-4)	3		50	50	1.5
	PC-II-3	Practical Core Course-II (Paper-3)	3		50	50	1.5
	PC-II-4	Practical Core Course-II (Paper-4)	3		50	50	1.5
		Foundation Course (FC)					
	FC-3	Foundation (**Generic**) Course – III Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-3	Elective (**Generic**) Course –III	2		50	50	2
	ES-3	Elective (**Subject**) Course –III	2		50	50	2
			30	150	650	800	24
		Semester-IV					
		Core Compulsory (CC)Course					
	CC-I-5	Core Course-I (Paper-5)	3	30	70	100	3
	CC-I-6	Core Course-I (Paper-6)	3	30	70	100	3
	CC-II-5	Core Course-II (Paper-5)	3	30	70	100	3
	CC-II-6	Core Course-II (Paper-6)	3	30	70	100	3
		Practical Core (PC) Course					
B. Sc. Sem-IV	PC-I-5	Practical Core Course-I (Paper-5)	3		50	50	1.5
	PC-I-6	Practical Core Course-I (Paper-6)	3		50	50	1.5
	PC-II-5	Practical Core Course-II (Paper-5)	3		50	50	1.5
	PC-II-6	Practical Core Course-II (Paper-6)	3		50	50	1.5
		Foundation Course (FC)					
	FC-4	Foundation (**Generic**) Course – IV Compulsory English (L.L.)	2	30	70	100	2
		Elective Course (E)					
	EG-4	Elective (**Generic**) Course –IV	2		50	50	2
	ES-4	Elective (**Subject**) Course –IV	2		50	50	2
			30	150	650	800	24

Hemchandracharya North Gujarat University, Patan
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester end Examination
Format for Question paper Elective Courses (Subject) in Physics

There will be three questions. First question will be from Unit - I, Second question from Unit-II, and Third question will be from both the Units. All the questions are detailed as under.

Time: 2Hrs   **Total Marks: 50**

1 (a) Answer the following (Any two out of three)   08 Marks
     (Theory questions)

   (b) Attempt any two of following (Out of three)   06 Marks
       (Theorytype **or** Application/Example/Problem)

   (c) Attempt any three (Out of five)   06 Marks
       (Short answer or objective type questions)

2 (a) Answer the following (Any two out of three)   08 Marks
     (Theory questions)

   (b) Attempt any two of following (Out of three)   06 Marks
       (Theorytype **or** Application/Example/Problem)

   (c) Attempt any three (Out of five)   06 Marks
       (Short answer or objective type questions)

3   Answer the following (Any ten out of twelve)   10 Marks

   (M.C.Q. Type **or** objective type)

Hemchandracharya North Gujarat University, Patan
B.Sc. Programme (CBCS-Semester-Grading pattern)
Semester end Examination
Format for Question paper Core Compulsory Courses in Physics

There will be four questions. First three questions are of 20 marks each and forth question is of 10 marks. First question will be from Unit - I, Second question from Unit-II, Third question from Unit-III, Forth question will be from all three Units. All the questions are detailed as under.

Time: 3Hrs
Total Marks: 70

1. (a) Answer the following (Any two out of three)
   (Theory questions)
   12 Marks

   (b) Attempt any four (Out of five)
   (Short answer/ objective/ MCQ type questions)
   04 Marks

   (c) Attempt any one (Out of two)
   04 Marks

   (Application/Example/Problem)

2. (a) Answer the following (Any two out of three)
   (Theory questions)
   12 Marks

   (b) Attempt any four (Out of five)
   (Short answer/ objective/ MCQ type questions)
   04 Marks

   (c) Attempt any one (Out of two)
   (Application/Example/Problem)
   04 Marks

3. (a) Answer the following (Any two out of three)
   (Theory questions)
   12 Marks

   (b) Attempt any four (Out of five)
   (Short answer/ objective/ MCQ type questions)
   04 Marks

   (c) Attempt any one (Out of two)
   (Application/Example/Problem)
   04 Marks

4. Answer the following (Any five out of Eight)
   (Short answer or objective type questions)
   10 Marks

B.Sc. Semester-III

PHYSICS SYLLABUS

CC: PHY-301

UNIT - I

Heat and Thermodynamics:

Characteristic functions, Enthalpy (11.1), The Helmolt'z and Gibb's function (11.2),Two Mathematical Theorems (11.3), Maxwell's equations (11.4), The T-ds equations (11.5), Energy equation (11.6), The Thermal Expansivity (11.9), Compressibility (11.10), Joule-Kelvin effect (Porous plug Experiment) (12.1), Liquefaction of Gases by Joule-Kelvin effect (12.2).

Basic Reference :
Heat and Thermodynamics by Mark W. Zeemansky (5th Edition)

Kinetic Theory of Gases:

Maxwell's Distribution Law of Velocities, Deduction of Maxwell – Boltzmann law , Determination of the values of constants 'a' and 'b' (6.5), Experimental Test of Maxwell's Law (6.6).

Basic Reference:
Thermodynamics and Statistical Physics by Singhal- Agarwal-Prakash Pragti Prakashan, Meerut.

Other References:
1. University Physics by Sears, Zeemansky and Young. (6th Edition)
   Narosa Publication, New Delhi.
2. Heat Thermodynamics and Statistical Physics by Brijlal, Dr. Subrahmanyam, P.S.Hemne S.Chand.
3. Waves and Oscillations by N Subramanyam, Brijlal.

UNIT – II

Diffraction:

Distinction between Interference and diffraction (17.6), Fresnel and Fraunhoffer types of diffraction (17.7), Fraunhoffer diffraction at a double slit (18.4), Fraunhoffer diffraction at double slit (Calculus method),(18.4.1), Distinct between single slit and double slit diffraction pattern (18.4.2), Fraunhoffer diffraction at N slit (18.6 & 18.6.1), Plane diffraction grating (18.7), Theory of plane transmission grating (18.7.1), Dispersive power of Grating (18.7.7).

Basic Reference :

A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand

Special theory of Relativity:

Newtonian Relativity (14.1), Michelson-Morley experiment (14.2), Special theory of relativity (14.3), Lorentz Transformation (14.4), Consequences of Lorentz Transformation (14.5)-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities (14.6), Mass-energy relation (14.8), Space time (14.9).

Basic Reference:

Introduction to Classical Mechanics by Takwale & Puranik Tata McGraw-Hill Publication (7th reprint-1986)

Other References:

1. A Text book of Light   by D.N.Vasudeva - S. Chand & Co.
2. Fundamentals of Optics   by Jonkin's and White
3. Optics   by Ajoy Ghatak
4. Principles of Optics   by B.K. Mathur

5. Concept of Modern Physics   by Besier   McGraw–Hill
6. Elements of Special Relativity   by S.P.Singh & M.K.Bagde S. Chand & Co. New Delhi.
7. Properties of Matter   by Brijlal, N.Subrahmanyam, S.Chand.

UNIT - III

Crystal Structure:

Crystalline and Amorphous Solids (1.1), Crystal Lattice and Crystal Structure (1.2), Translational Symmetry, Space, Unit Cell and Primitive Cell (1.3), Symmetry Elements in Crystals (1.4 [1.4.1 to 1.4.6]), The Seven crystal Systems (1.5), Coordination Number (1.5.1), Some importance crystal structure (1.6), Simple Cubic Structure (1.6.1), Body Centered Cubic Structure (1.6.2), Face Centered Cubic Structure (1.6.3), Wigner-Seitz Cells (1.7), Miller Indices (1.8), The spacing of a set of crystal planes (1.11).

Basic reference:

Solid State Physics By Ajay Kumar Saxena (Macmillan India Limited)

Atomic Spectra:

Franck-Hertz experiment (2.16), Critical potentials (2.17) Shortcomings of Bohr's Theory (2.19), Summerfield extension of Bohr theory (2.20)
Basic reference:
Atomic and Molecular Physics By Raj Kumar (Campus Books)

Other reference:

1.Introduction to Solid State Physics By C.Kittle (John Willey)

2.Fundamental of Solid State Physics By Saxena, Gupta, Saxena (Pragati Prakashan)
3.Elements of Solid State Physics by J.P.Srivastava(PHI).

B.Sc. Semester-III
PHYSICS SYLLABUS

CC: PHY-302

UNIT-I

Electrostatics in Dielectric:

Gaseous Non-Polar Dielectrics (2.11), Gaseous Polar Dielectrics (2.12), Non-Polar Liquids (2.13), Solid Dielectrics-Electrets (2.14).

Magnetostatics:

The Magnetic Potentials (4.9 – a & b), Magnetic Vector Potential due to Small Current Loop (4.12), An alternative method for finding the Vector Potential A and the Field B due to Current Loop (4.13), Magnetization (4.15), Magnetic Field Vector (4.16), Magnetic Susceptibility and Permeability (4.17), Boundary Conditions (4.18), Uniformly Magnetized Sphere in External Magnetic Field (4.19), A Comparison of Static Electric and Magnetic Fields (4.20).

Basic Reference :
Electromagnetics by B.B. Laud, New Age Int. Publisher (For Chapt. a & b)

Other Reference:
1. Electricity and Magnetism   by Maharajan and Rangwala, THM
2. Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL, McGraw Hill Pub.

UNIT-II

Transistors Biasing and Stabilization:

Bias Stabilization (Operating point stabilization) (8.7, 8.7.1 & 8.7.2), Stability factor (8.8), Stabilization by Collector Base Resistance (8.9) Stabilization by potential divider and Emitter resistor (8.10)

Basic Transistor Amplifier:

Transistor as a four pole (9.2), h-parameters with h-parameters equivivalent circuit (9.5 complete), Grounded Emitter Circuit - Mathematical analysis using h- parameters only (9.6), Comparative Study of three types of Amplifiers (9.9).

Solid state Devices:

JFET (12.1 to 12.6), UJT (26.6, 26.6.1 to 26.6.3). .

Basic Reference :
Hand book of Electronics by Gupta & Kumar 30th Revised Edition,2002 Pragati Prakashan
Electronics andRadio Engineering by M.L. Gupta (9th Edition-2002) D Raj & Sons.(For Ch-(C))

Other References:
1. Electronic Devices and Circuits   by A.Mottershead Prentice – Hall of India.
2. Integrated Electronics   by Millman & Halkias
3. Basic Electronics and Linear Circuits   by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta.

UNIT-III

Fourier series:

Introduction (7.1), Periodic functions (7.2), Application of Fourier series (7.3), Average values of a function (7.4), Fourier Co-efficient (7.5), Diriclet's conditions (7.6), Complex form of Fourier series (7.7), Perseval Theorem (7.11).

Co-ordinate Transformation:

Curvilinear Coordinates (10.6), Scale factors and basis vectors for orthogonal systems (10.7).

Basic References:

1. Mathematical method for physical sciences   by M. L. Boss John Wiley Publication.

Schrodinger Equations:

A free particle in one dimension (2.1), Generalization to three dimensions (2.2), The operator correspondence and the Schrodinger equation for a particle subject to forces (2.3), Normalization and Probability Interpretation (2.4), Non-Normalizable Wave functions and Box Normalization (2.5).

Basic reference:

Quantum Mechanics by John L. Powell and Bernd Crasemann (for Arti.1.1,1.3,&1.17)
A Textbook of Quantum Mechanics By P.M.Mathews and K.Venkatesan (TMH) (for Arti. 2.1,to 2.5)

Other reference:

1. Atomic Physics by Rajam (S. Chand New Delhi)

2. Quantum mechanics by Powell and Creaseman

3. Mathematical Physics   by B.D.Gupta

CBCS - Semester - Grading Pattern

B.Sc. Semester-III

PHYSICS SYLLABUS

PC: PHY-301

LABORATORY EXPERIMENTS

1. Coaxial Viscometer
2. To determine wave length of bright lines of mercury light using grating.
3. R.P. of Telescope
4. Searl's Goneometer. Determination of cardinal points and 'do'
5. Kundt's tube. Determination of 'y'
6. Diffraction by Adser 'A' Patttetrn
7. e/k by Power Transistor

= * = * = * =

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B.Sc. Semester-III
PHYSICS SYLLABUS

PC: PHY-302

LABORATORY EXPERIMENTS

1. Absolute value of capacity using B.G. or S.G.
2. Low resistance by method of Projection
3. Comparison of capacity (C_1/C_2) by Desauty method
4. To determine self inductance by Anderson Bridge
5. Characteristics of a C.B. Transistor (PNP)
6. Characteristics of JFET & Determination of μ, r_d, g_m
7. Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

= * = * = * =

B.Sc. Semester-IV
PHYSICS SYLLABUS

CC: PHY-401

UNIT-I

Atomic Cohesion and Crystal Binding:

Cohesion of Atoms(2.1), Primary Bonds (2.2), The Covalent Bond (2.2.1), The Metallic Bond (2.2.2), The Ionic Bond (2.2.3), Mixed Bond (2.2.4), Secondary Bonds(2.3), The Vander wall's Bond (2.3.1), The Hydrogen Bond (2.3.2), The Cohesive Energy(2.4), Ionic Crystal (2.4.1), Noble Gas Crystal (2.4.2), Atomic Radi.Vs Lattice constants (2.5), Elastic constants of crystals (2.6), Elastic Stress (2.6.1), Elastic strain(2.6.2), Dilation(2.6.3), Elastic Compliance and Stiffness constant (2.7), Elastic Energy density (2.7.1), Application to Cubic crystal (2.7.2), Bulk Modulus and compressibility (2.7.3).

Basic Reference :

Elements of Solid State Physics. (2003) by J. P.Srivastava, PHI.

Other References

1. Introduction to Solid State Physics by C.Kittel, Wiley Estarn. Delhi
2. Solid State Physics by Saxena, Pragati Prakasion.
3. Solid State Physics by C. M. Kachhawa

UNIT-II

Physical Interpretation and Condition on 'Ψ':

Conservation of Probability (2.6), Expectation values, Ehrenfest's Theorem (2.7), Admissibility Condition on the Wave function (2.8)

Stationary States and Energy Spectra

Stationary states : The time Independent Schrödinger Equation (2.9), A particle in a square well potential (2.10), Bound States in a square well $(E > 0)$ (2.11), The square well: Non localized states $(E > 0)$ (2.12).

Basic Reference:

A Text Book of Quantum Mechanics by Mathews and K.Venkatesan Tata Mc-Graw Hill Publication

Resolving Power:

Resolving Power of Optical Instrument (19.5), Resolving Power of a telescope (19.7), Relation between magnifying power and resolving power of a telescope (19.7.1), Resolving Power of a Plane transmission grating (19.12).

Basic Reference :

A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand.

Other References: .
1. Quantum Mechanics   by John L. Powell and Bernd Crasemann
2. Quantum Mechanics   by Ghatak and Loknath
3. Quantum Mechanics   by Schiff
4. A Text book of Light   by D.N.Vasudeva - S. Chand & Co.
5. Fundamentals of Optics   by Jonkin's and White
6. Optics   by Ajoy Ghatak
7. Principles of Optics   by B.K. Mathur

UNIT-III

The Basic concepts of Plasma:

Introduction (1.1), Composition and Characteristics of a Plasma (1.2), Collisions (1.3), Elastic collisions (1.3.1), Inelastic collisions (1.3.2), Surface Phenomena (1.4), Transport Phenomena (1.5), Diffusion and Mobility (1.6), Viscosity, Conductivity (1.7), Recombination (1.8), Ohm's law (1.9), Gas Discharge (1.10), Composition of various natural and Man-made Plasma (1.11), Plasma diagnostics (1.12), Plasma waves and Instabilities Confinement of Plasma (1.13), Space Plasma (1.14).

Basic Reference:
Elements of Plasma Physics   by S.N.Goswami New Central book Agency (P) Ltd., Calcutta.

Polarization:

Introduction (20.1), Polarization by double refraction (20.5.5), Double refraction (20.8.3), Huygens' explanation of double refraction (20.9 & 20.9.1), Types of polarized light, (20.15), Retarders or Wave plates(20.17), Quarter wave plate (20.17.1), Half wave plate(20.17.2),Production of Elliptically polarized light(20.18), Detection of Elliptically polarized light(20.18.1).

Basic Reference :

A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand.

Other References:
1. Introduction to Plasma Physics and Controlled Fusion Vol.-1 by F.F.Chen.
2. Plasma Physics   by S.N.Sen
3. A Text book of Light   by D.N.Vasudeva - S. Chand & Co.
4. Fundamentals of Optics   by Jonkin's and White
5. Optics   by Ajoy Ghatak
6. Principles of Optics   by B.K. Mathur

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

CBCS - Semester - Grading Pattern

B.Sc. Semester-IV

PHYSICS SYLLABUS

CC: PHY-402

UNIT-I

Digital Electronics:

Introduction (21.1), Number systems used in Digital Electronics (21.2), Decimal, Binary, Hexadecimal and Octal (21.2.1 to 21.2.4), Binary Codes-(A) BCD, (B) Gray, (C) Excess-3 Codes (21.4), Arithmetic Circuits – Exclusive - OR Gate (21.9), Applications of X-OR Gate: (i) Binary to Gray Code Converter (ii) A Parity Checker (iii) The Half Adder (iv) The Full Adder (v) Parallel Adder (vi)Half subtractor, (vii)Full subtractor.

Basic Reference :

Hand book of Electronics by Gupta & Kumar 30th Revised Edition, 2002 Pragati Prakashan, Meerut.

A.C. Bridges:

A.C. Bridges (17.5), Maxwell's Bridge (17.6.1), Schering Bridge (17.7.3)

Basic reference:

Electricity and Magnetism By K.K.Tewari (S.Chand & Company Ltd.)

Programming in – C:

Overview of C : History of C (1.1), Importance of C (1.2), Sample Program: Printing a Message (1.3), Basic Structure of C Programs (1.8), Programming Style (1.9), Executing a C Program (1.10).

Basic Reference :

Programming in ANSI C by E.Balaguruswami (THM) (3rd Edition)

UNIT-II

Detectors:

Introduction (1.1.1), Detectors for Nuclear Particles (1.1.3), (i) Proportional Counter (ii) Semiconductor detectors,

Radioactivity:

(Review of Radioactive decay laws, half life,mean life time etc.) Radioactive growth and decay (2.6) Ideal equilibrium (2.7) Transient equilibrium and secular equilibrium (2.8) Radioactive series (2.9)

The Q- Equation:

       Introduction (3.1), Types of Nuclear Reactions (3.2), The Balance of Mass and Energy in Nuclear Reactions (3.3), The Q-Equation (3.4), Solution of the Q-Equation (3.5).

Basic reference:

Nuclear Physics by S.B.Patel (New age International (p) Ltd. Publishers)

Other References:

1. Elements of Nuclear Physics   by M.L.Pandya & R.P.S.Yadav Kedarnath Ramnath Meerut
2. Nuclear Physics   by Kaplan

UNIT-III

Modern Physics:

       Orbital and Magnetic Dipole Moment (4.1), Larmor Precession (4.2), Space quantization (4.3), Electron spin (4.4), Vector model of atom (4.5), Spectroscopic terms and their notations (4.6), Stern Gerlach Experiment (4.7), Pauli's Exclusion Principle (4.8). Zeeman Effect- Normal Zeeman Effect and anomalous Zeeman Effect (12.1), Explanation of Normal Zeeman Effect (12.2), Explanation of Anomalous Zeeman Effect (12.3), Paschan back effect (12.4).

Basic Reference:

Atomic & Molecular spectra by Rajkumar Kedarnath Prakashan Meerut

Other Reference:

1. Spectroscopy Vol.-I   by Walker & Straw
2. Atomic Physics   by J.B.Rajam (5th Edition-1960) S. Chand & Co.
3. Physics of Atoms and Molecules by B.H.Bransden & C.J. Joachagh, Pearson Education.

B.Sc. Semester-IV

PHYSICS SYLLABUS

PC: PHY-401

LABORATORY EXPERIMENTS

1. Resonance pendulum. Determination of 'lo' , 'r' & 'a'
2. Study of X-ray diffraction (Powder) Pattern.
3. Decay of Temperature when body is allowed to cool.(thermocouple)
4. To study elliptically polarized light using photocell and quarter wave plate.
5. To determine λ using Hartzmann formula
6. Activation energy of a semiconductor
7. Absorption co-efficient of liquid using photocell.

= * = * = * =

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B.Sc. Semester-IV
PHYSICS SYLLABUS

PC: PHY-402

LABORATORY EXPERIMENTS

1. Study of B.G. : To determine current sensitivity, volt sensitivity, figure of merit and Rg of B.G.
2. High resistance by equal deflection method.
3. Low resistance by Carry foster bridg.
4. To determine low value of 'C' using Schering bridge.
5. Characteristics of UJT & Determination of R_{BB}, V_D & η
6. Characteristics of a Photodiode
7. To verify Demorgan's Theorems using IC-7400.

= * = * = * =

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
List of Elective (Subject) Courses For IIIrd and IVth Sem.
(in force from June 2011)
Credits-2

1. VACUUM PUMPS, PRESSURE GUAGES AND INSTRUMENTS

2. ASTRO/ SPACE PHYSICS

3. ENERGY TECHNOLOGY

DETAIL SYLLABUS

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-04
VACUUM PUMPS, PRESSURE GUAGES AND INSTRUMENTS

UNIT-I

Vacuum Pumps, Pressure Guages:

Exhaust Pumps and their characteristics(15.1), Rotary Oil Pumps(15.2), Molecular Pump(15.3), Diffusion Pump(15.4), Other methods of Producing Low Pressures(15.5), Pressure Gauges - McLeod Guage, Pirani Guage, Thermocouple Guage, Ionization Gauge,(15.7).

Errors in measurement:

Errors of observations, Types of errors, Normal law of errors, Average, standard and probable errors, Percentage error.

UNIT-II

Optical Instruments:

Travelling Microscope, Cathetometer, and Optical bench.

Objective and Eyepiece, Kellner's Eyepiece, Huygens Eyepiece, Ramsden Eyepiece, Comparission of Ramsden Eyepiece and Huygens Eyepiece, Gauss Eyepiece, Telescopes, Refracting Astronomical Telescope, Reflecting Telescope, Newton's Telescope, Other reflecting Telescopes.

Electrical Instruments:

Moving coil Galvanometer, Ballistic Galvanometer, Calibration of Ballistic Galvanometer using different methods, Multimeters, Digital multimeter, Earphone and Headphone.

Basic Reference :

1. An Advanced Course in Practical Physics by D.Chattopadhyay, P.C. Rakshit, B.SAHA,

New Central Book Ltd.

2. A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu

- S.Chand.(Ch-10.8 to 10,16)

3. Mechanics   by D.S.Mathur **S.**Chand.(For Vacuum pumps)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-05
(in force from June 2011)

ASTRO/ SPACE PHYSICS

UNIT-I

Sun and Solar Radiation:
Introduction, Astronomical background, General description of the sun, Solar structure, Sun's outer layers, Composition, Visible features on the sun, More about sun's outer atmosphere, Temperature of the corona, Solar activity and Sunspot cycles.

UNIT-II

Cosmic rays and High energy astrophysics

An introduction to cosmic rays and high energy astrophysics: primary cosmic radiation, energy spectrum of primary cosmic rays, secondary cosmic rays, effect of geomagnetic field on cosmic rays, time variation of cosmic rays, photons in primary cosmic rays, origin of cosmic rays, basic facts about cosmic rays, region of confinement

Basic Reference:
An Introductory Course on Space Science and Earth's Environment
by   S.S.Degaonker (Gujarat University Publication, Ahmedabad)

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
B. Sc. :: PHYSICS :: SEMESTER-III & IV
ES PHY-06
(in force from June 2011)

ENERGY TECHNOLOGY

UNIT - I:

Introduction:

What is energy! , Energy Science and Technology, Energy, mass and environment, Some well known forms of energy, Energy Resources and forms of energy, Energy demand, Energy Routes for Conventional energy resources, National energy strategies, and energy plan, Energy management, Cost comparission of energy resources and conversion, Energy Conservation opportunities.

Environmental aspects of energy:

Introduction, Polution from use of energy, Conbustation Products of Fossil Fuels, Particulate Matter, Electrostatic Precipitator(ESP), Fabric Filter and Baghhouse.

UNIT-II

Geothermal Energy:

Introduction, Applications, Utilization of Geothermal Energy, Geothermal Energy Resources, Hydro Geothermal Resources, Hot Dry Rock Geothermal Resources. Merits and demerits of Petro-Geothermalenergy Power Plant, Geothermal Electrical Power Plants, Classification and types of Geotermal Power plants,

Wind Energy:

Introduction, Applications of Wind Energy and Historical Background, Merits and limitations of Wind energy Conversion, Nature and Origion of Wind, Wind Energy Quantom, Variables in Wind Energy Conversion systems, Wind power density, Power in wind Stream, Wind turbine Efficiency. Types of wind Turbine-Generator Units, Characteristics of wind turbine generator, Mono-blade HAWT, Twin-blade HAWT

References:

(1) Energy Technology by S.Rao and Dr. B.B. Parulekar, Khanna Pub.-1995 1st edition

(2) Solar Energy conversion, An introductory course By A. E. Dikon and J. D. Loslie

(3) Principles of Energy Conversion By Archie W. Cupl Jr.