

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 be 20 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	Examination			Credit
				Internal	Uni. Exam	Total	
B. Sc. Sem –III	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
	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
B. Sc. Sem-IV	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						
	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)
(Theory questions) | 08 Marks |
| | (b) Attempt any two of following (Out of three)
(Theorytype or Application/Example/Problem) | 06 Marks |
| | (c) Attempt any three (Out of five)
(Short answer or objective type questions) | 06 Marks |
| 2 | (a) Answer the following (Any two out of three)
(Theory questions) | 08 Marks |
| | (b) Attempt any two of following (Out of three)
(Theorytype or Application/Example/Problem) | 06 Marks |
| | (c) Attempt any three (Out of five)
(Short answer or objective type questions) | 06 Marks |
| 3 | Answer the following (Any ten out of twelve)

(M.C.Q. Type or objective type) | 10 Marks |

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 fourth question is of 10 marks. First question will be from Unit - I, Second question from Unit-II, Third question from Unit-III, Fourth 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)

(Application/Example/Problem) | 04 Marks |
| 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 |

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

CC: PHY-301

UNIT - I

Heat and Thermodynamics:

Characteristic functions, Enthalpy (11.1), The Helmholtz 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. Zemansky (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, Zemansky 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 Fraunhofer types of diffraction (17.7), Fraunhofer diffraction at a double slit (18.4), Fraunhofer diffraction at double slit (Calculus method),(18.4.1), Distinct between single slit and double slit diffraction pattern (18.4.2), Fraunhofer 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), Sommerfield 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).

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
CBCS - Semester - Grading Pattern
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 equivalent 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 and Radio 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), Parseval 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

HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN
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 Goniometer. Determination of cardinal points and 'do'
5. Kundt's tube. Determination of 'y'
6. Diffraction by Adser 'A' Pattern
7. e/k by Power Transistor

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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.

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HEMCHANDRACHARYA NORTH GUJARAT UNIVERSITY, PATAN

CBCS - Semester - Grading Pattern

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), Retardors 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.Brandsden & C.J. Joachagh, Pearson Education.

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

PC: PHY-401

LABORATORY EXPERIMENTS

1. Resonance pendulum. Determination of 'l', '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.

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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.

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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)

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**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 comparison of energy resources and conversion, Energy Conservation opportunities.

Environmental aspects of energy:

Introduction, Pollution from use of energy, Combustion Products of Fossil Fuels, Particulate Matter, Electrostatic Precipitator(ESP), Fabric Filter and Baghouse.

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 Geothermal Power plants,

Wind Energy:

Introduction, Applications of Wind Energy and Historical Background, Merits and limitations of Wind energy Conversion, Nature and Origin of Wind, Wind Energy Quantum, 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.