KADI SARVA VISHWAVIDYALAYA
GANDHINAGAR

B.Sc. PHYSICS
SYLLABUS

KadiSarvaVishwavidyalaya, Gandhinagar

B. Sc. Physics

Course Description: This course is designed to enable students to acquire understanding of fundamentals of Physics. The course provides practical training on chemical techniques and processes to extract useful knowledge in the areas of Theoretical Physics & Experimental Physics for upcoming industries, research institutes and academics.

COURSE STRUCTURE:

Year	Semester	Paper	Paper Name	Marks	Practical	Total Marks
B.Sc I	I	CPH-101	Introduction to General Physics	100	50	150
	II	CPH-201	Fundamentals of Physics	100	50	150
B.Sc II	III	CPH-301	Basic Physics-I	100	50	150
		CPH-302	Basic Physics-II	100	50	150
	IV	CPH-401	General Physics-I	100	50	150
		CPH-402	General Physics-II	100	50	150
B.Sc III	V	CPH-501	Mathematical Physics, Classical & Quantum Mechanics-I	100	200	600
		CPH-502	Modern Physics-I	100		
		CPH-503	Modern Physics-II	100		
		CPH-504	Electronics and 'C' Programming-I	100		
	VI	CPH-601	Mathematical Physics, Classical & Quantum Mechanics-II	100	200	600
		CPH-602	Modern Physics-III	100		
		CPH-603	Modern Physics-IV	100		
		CPH-604	Electronics and 'C' Programming-II	100		

Third Year B.Sc. (Physics)

Semester V

	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
B.Sc. (Physics) Sem- V	**CPH-501**	Mathematical Physics, Classical & Quantum Mechanics-I	3	30	70	100	3
	CPH-502	Modern Physics-I	3	30	70	100	3
	CPH-503	Modern Physics-II	3	30	70	100	3
	CPH-504	Electronics and 'C' Programming-I	3	30	70	100	3
	PPH-501	Physics Practical	12		200	200	6
	EPH- 501 A **OR** **EPH- 501 B**	Instruments OR Programming in Fortran 90 and 95	2		50	50	2
	EGC- 501	Environmental science & Disaster Management	2		50	50	2
	FCG-501	Basic English – V	2	15	35	50	2
			30	135	615	750	24

Semester- V

CPH 501- Mathematical Physics, Classical & Quantum Mechanics-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 501	Mathematical Physics, Classical & Quantum Mechanics-I	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

MATHEMATICAL PHYSICS

(a) Differential Equations

Some partial differential Equations Physics, The method of separation of variables, Separation of Helmholtz equation in Cartesian Coordinates, Separation of Helmholtz equation in spherical polar Coordinates, separation of Helmholtz equation in cylindrical coordinates, Laplace's equation in various coordinate systems.

(b) Second order differential Equations

Ordinary and singular points. Series solution around and ordinary point, Series Solution around a regular singular point (The method of Forbenius).

Unit - II **Number of lectures: 15**
Weightage: 33%

CLASSICAL MECHANICS

- **(a) Lagrangian Formulation**
  Constraints, generalized coordinates, D'aleffibert's principle, Lagrange's equations, A general expression for kinetic energy, Symmetries and the laws of conservation, Cyclic or ignorable coordinates, Velocity dependent potential of electromagnetic field
- **(b) Motion of Rigid Body**
  Euler's theorem, Angular momentum and kinetic energy, The inertia tensor, Euler's equation motion.

UNIT - III **Number of lectures: 15**

Weightage: 33%

QUANTUM MECHANICS

General formalism of Wave Mechanics

- The Schrodinger equation and Probability interaction for N- particle system, The fundamental postulates of wave mechanics, Adjoint of an operator and self Adjointness, The Eigen value problem, Degeneracy, Eigen values and Eigen functions of self-adjoint operators, The Dirac delta function, Observables, completeness and normalization of Eigen functions, Closer, physical interpretation of Eigen values, Eigen function and expansion coefficients, Momentum eigen functions : wave functions in momentum space, uncertainly Principle, States with minimum value for uncertainly product, commuting observable : Removal of degeneracy. Evolution of system with time Constants of the motion.

REFERENCES:

1. Mathematical Physics by P. K. Chatopadhyay. Wiley East Ltd.
2. Mathematical Physics by B.D.Gupta.
3. Mathematical Physics by H.K.Dass.4. Nuclear Physics by S.B.Patel (New age International (p) Ltd. Publishers)
4. Introduction to classical mechanics by Takawale and Puranic. THM Publication.
5. Classical Mechanics, by Goldstein. Narosa Publishing House, New Delhi.
6. Classical Mechanics by YasvantWaghmare.
7. Classical Mechanics by N.C.Rana and P.S.Joag, THM9. Atomic Physics by J.B.Rajam (5th Edition-1960) S. Chand & Co.
8. A text book of Quantum Mechanics by P.M. Methews and K. Venkateshan, THM.

9. Quantum Mechanics by Ghatak and Loknathan, The Macmillan Company of India Limited.
10. Quantum Mechanics by Fschwabi, Narosa Publishing House, New Delhi.
11. Quantum Mechanics by John, L. Powell and B. Crasemann.
12. Quantum Mechanics by Schiff.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- V

CPH 502- Modern Physics-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 502	Modern Physics-I	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

- **STATISTICAL MECHANICS**
  (a) Macroscopic and Microscopic states
  Macroscopic States, Microscopic States, Phase Space, μ-Space, τ-Space, Postulate of equal a priori probability.

- **(b) Statistical Ensembles**
  Micro canonical ensemble, Canonical ensemble, Alternative method for the derivation of canonical distribution, Mean value and Fluctuations, Grand Canonical Ensemble, Alternative derivation of Grand Canonical Distribution, Fluctuations in the number of particle of a system in a grand canonical ensemble, Reduction of a Gibb's distribution to Maxwell's and Boltzmann distribution, Barometric formula, Experimental verification of the Boltzmann's distribution.

Unit - II **Number of lectures: 15**
Weightage: 33%

SOLID STATE PHYSICS

- **(a) Free Electron Theory of Metal**
  Thermal conductivity of metals, The F.D. distribution function, The Sommerfield Model, Density of states, The free electron gas at 0◦ K, Energy of electron at 0◦ K, The electron heat capacity, The SommerfieldTheory of conduction in metals, The Hall coefficient.

- **(b) Application to Plasmons, Polaritons and Polarons**
  Application to Plasma, Plasma oscillations, Transverse optical mode in plasma, Application to optical phonon modes in ionic crystals, The longitudinal optical mode, Transverse optical mode, The interaction of electromagnetic waves with optical modes.

UNIT – III **Number of lectures: 15**

Weightage: 33%

PLASMA PHYSICS

- **Characteristics of a Plasma in a Magnetic field**
  Description of plasma as a gas mixture, Properties of plasma in magnetic field, Force on plasma in magnetic field, Current in Magnetized Plasma, Diffusion in a Magnetic field, Collisions in fully ionized magneto-plasma, Pinch Effect, Oscillations and waves in the plasma, Plasma frequency, Maxwell's equation in a homogenous plasma, Electromagnetic or Transverse Oscillations, Electrostatic or Longitudinal oscillations ($\overrightarrow{B_a} = 0$), Oscillations of the plasma ($\overrightarrow{B_a} \neq 0$), Hydromagnetic waves, Resonances and cut-offs or reflection points.
- **(b) Applications of Plasma**
  Controlled Thermonuclear Reactions, Lawson criterion, The Coulomb Barrier, Heating and Confinement of the Plasma, Radiation loss of energy, Magnetohydrodymic conversion of energy, Plasma propulsion, Other plasma devices.

REFERENCES:

1. Fundamentals of Statistical Mechanics by B. B. Laud. New Age International Publisher (copy right 1998)
2. Statistical Mechanics and Properties of Matter by E.S.R.Gopa
3. Elements of Solid State Physics by J.P. Srivastava,PHI New Delhi (2003)
4. Solid State Physics by A. J. Dekker.
5. Introduction to Solid State Physics by C. Kittel. 7th Edition, John Willy and Sons
6. Elements of Plasma Physics by S. N. Goswami, New Central Book Agency (P). Ltd. Calcutta. Reprint (2000).

7. Introduction to Plasma Physics by F.F.Chen. Plenum Press.
8. Plasma Physics by S. N. Sen, PragatiPrakashan, Meerut.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- V

CPH 503- Modern Physics-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 503	Modern Physics-II	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

RADIO ACTIVITY

- **(a) Alpha Rays : Spectra and Decay**
  Range of Alpha Particles, Disintegration energy of the Spontaneous Alpha-Decay, Alpha-Decay Paradox-Barrier Penetration.
- **(b) Beta Rays : Spectra and Decay**
  Introduction, Continuous Beta ray spectrum-Difficulties in understanding it, Pauli's Neutrino Hypothesis, Fermi's theory of Beta-decay, The Detection of Neutron.
- **(c) Gamma-Ray Emission:**
  Introduction, Gamma - ray emission - selection rules, Internal conversion.

Unit - II **Number of lectures: 15**
Weightage: 33%

NUCLEAR PHYSICS

- **(a) Nuclear Energy:**
  Introduction, Neutron Induced Fission, Asymmetrical Fission-Mass

Yield, Emission of Delayed Neutrons by Fission Fragments, Energy Released in the Fission of U--235, Fission of Lighter Nuclei, Fission Chain Reaction, neutron cycle in a Thermal Nuclear Reactor, Nuclear Reactors.

- **(b) Elementary Particles:**
  Leptons, Hadrons, Elementary particle quantum numbers, Isospin, Symmetries and- conservation principles, Quarks, fundamental Interactions.

UNIT - III **Number of lectures: 15**
Weightage: 33%

MOLECULAR SPECTRA

- **(a) Pure Rotational and Vibrational - Rotational Spectra**
  Types of Molecular Spectra, Salient Features of Rotational Spectra, Molecular requirement for Rotational Spectra, Experimental Arrangement, The molecule as a rigid rotator: Explanation of rotational spectra, The Non-rigid Rotator, The Isotope Effect, Salient Features of Vibrational-Rotational Spectra, The Molecule as a Harmonic Oscillator.

- **(b) Raman and Electronic Spectra**
  Nature of the Raman Effect, Experimental Arrangement for Raman Spectra, Classical Theory of Raman Effect, Quantum theory of Raman Effect, Raman Spectra and Molecular Structure, Infra-red Spectra Versus Raman Spectra, Salient Features of Molecular Electronic Spectra, Formation of Electronic Spectra.

REFERENCES:

1.Nuclear Physics (An Introduction) by S. B. Patel, Willey Eastern Ltd.

2. Concept of Modern Physics by A.Beiser. 5th edition, McGraw-Hill.

3. Atomic & Molecular-Spectra by RajKumar, KedarNath RamNath, Delhi.

4. Molecular spectroscopy by Herz-Berg.

5. Molecular spectroscopy by Banewell

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- V

CPH 504- Electronics and 'C' Programming-I

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 504	Electronics and 'C' Programming-I	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

Network Transformations:

Principle of duality, Reduction of Complicated network, Conversions between T and π sections, The bridged-T network, The Lattice Network, The Reciprocity theorem, The compensation theorem, Driving point impedance, transfer impedance, The parallel-T network.

Photo Electric Devices and Thyristors
Classification of Photoelectric devices, Photoconductive cells, Photovoltaic cells, SCR, Triac, Diac

Unit - II **Number of lectures: 15**
Weightage: 33%

Basic Transistor Amplifiers:
Current and Voltage amplifiers, Common Emitter Amplifiers with Emitter Resistor, Simplified Common Emitter Hybrid Model, Effect of An Emitter Bypass Capacitor in low frequency Response.

Multistage Amplifiers

	Multistage Transistor Amplifiers, R-C- coupled Amplifiers, Transformer Coupled Amplifiers, Direct coupled Amplifiers, Effect of cascading on Band width.
UNIT – III	**Number of lectures: 15** **Weightage: 33%** **Regulated DC Power Supply** Transistor Series voltage Regulator, Negative Feedback Voltage Regulator, Transistor Shunt Regulator, Transistor Current Regulator, Glow-tube Voltage regulator. **Constants, Variables & Data Types: (Programming in C)** Introduction, Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Declaration of Storage Class, Assigning Values of Variables, Defining Symbolic Constants, Declaring a Variable as Constant, Declaring a Variable as Volatile, Overflow and Underflow of Data.

REFERENCES:

1.Networks, Lines and Fields by J. D.Ryder. Pretice Hall.
2. Electronics and Radio Engineering by M. L. Gupta. 9th Enlarged Edition reprint 2002. (Dhanpat Rai Publication Co.)
3. Hand Book of Electronics by Gupta and Kumar. 30th revised Edition 2002.
4. Electronics and Radio Engineering by M. L. Gupta. 9th reprint 2002. (Dhanpat Rai Publication Co.)
5. Programming in ANSI ‘C’ by E.Balaguruswami (THM) (3rd Edition)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester V

PPH 501- Physics Practical

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 501	Physics Practical	6	12	200	200

Laboratory Course

LIST OF EXPERIMENTS

Group-1 (Non-circuitry I)

1. Acceleration due to gravity (g) using Kater's pendulum (with movable and fixed knife edges)
2. Determination of Thermal conductivity 'K' of a rubber tube.
3. Study of thermocouple
4. Velocity of sound in air using CRO
5. G.M. Counter (Plateau Characteristics)

Group-2 (Non-circuitry II)

1. Refractive index 'μ 'by total internal Reflection method usingGauss eye piece

2. Resolving power of grating
3. To study absorption spectra of Iodine gas molecule
4. Newton's Ring (determination of R)
5. To study absorption spectra of liquid ($KMnO_4$)

Group-3 (Circuitry I)

1. Comparison of capacity (C_1/C_2) using method of mixture
2. Measurement of frequency *f* and phase difference 'θ' of a.c wave using CRO
3. Calibration of magnetic field
4. Determination of M and H using Deflection and Vibrational Magnetometer
5. *e/m* Thomson method

Group-4 (Circuitry II)

1. A study of transistorized Hartley Oscillator using CRO/Wave meter
2. I/P and O/P impedance of an R-C CE amplifier at different frequency using VTVM/CRO
3. A study of Transformer coupled Amplifier using VTVM/CRO (voltage gain frequency response and band width)
4. Diac characteristics
5. Characteristic of SCR

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Semester V

Pattern of University Practical Exam

Time: 10:30am to 6:00pm (Including 30 minutes recess) Total Marks: 200

First Day

(A) Group-1 (35 marks)
(B) Group-2 (35 marks)

- ✓ Any one experiment to be performed from each group of experiments.
- ✓ **Evaluation Scheme:**
  - Aim / Apparatus - 2 marks
  - Diagrams/ Circuit Diagrams - 5 marks
  - Observation Tables - 15 marks
  - Calculations / Plots - 10 marks
  - Results, Discussion & Conclusion - 3 marks

(C) Viva- Voce on practical base (24 marks)

- ✓ **Evaluation Scheme:**
  - Group-1 - 12 marks
  - Group-2 - 12 marks

Second Day

(A) Group-3 (35 marks)
(B) Group-4 (35 marks)

- ✓ Any one experiment to be performed from each group of experiments.
- ✓ **Evaluation Scheme:**
  - Aim / Apparatus - 2 marks
  - Diagrams/ Circuit Diagrams - 5 marks
  - Observation Tables - 15 marks
  - Calculations / Plots - 10 marks
  - Results, Discussion & Conclusion - 3 marks

(C) Viva- Voce on practical base (24 marks)

- ✓ **Evaluation Scheme:**
  - Group-3 - 12 marks
  - Group-4 - 12 marks

Journal (12 marks)

Note: Certified practical journal is compulsory for practical exam.

FCG 501- Basic English– V

RATIONALE: This course is designed to enable students to acquire basic understanding of English grammar. The course would help students to fortify their knowledge of English and strengthen their basic communication abilities.

LEARNING OUTCOMES:

- Develop language skills of reading through filling in appropriate words in blanks, correcting errors, choosing correct forms out of alternative choices, etc.
- Acquire interest in English language and literature through textbook lessons.
- Acquire translation skill through translate from English to Gujarati/Hindi exercises
- Acquire the knowledge of different kinds of dialogue writing.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
FCG - 501	Basic English – V	2	24	15	35	50

COURSE CONTENT

Unit I **Number of lectures: 8**
Weightage: 33%

Lesson 1 :*An Astrologer's Day* by R.K.Narayan
Lesson 5 :*Vanishing Animals* by Gerald Durrell
Lesson 6 :*Education: India and America* by Anurag Mathur
Poem 11 : ***Where the mind is without Fear*** by Rabindranath Tagore
Poem 12 : ***Stopping by Woods on a Snowy Evening*** by Robert Frost
Poem 13 : ***Sonnet 29*** by William Shakespeare
'The Joy of Reading' – Selected Prose & Poetry

Unit II **Number of lectures: 4**
Weightage: 17%

Indirect Narration
Conjunction
Use of Phrasal Preposition and Verbs: (1) Inspite of (2) Instead of (3)Owing to (4)Due to (5)Because of (6)With a view to (7)On account (8)According to (9)In order to (10)Account for (11)Abide by (12)Look for (13)Wind up (14) Come across (15)Break into (16) Give in (17)Keep up (18)Look forward to (19)Put off (20) Set out (21) Run into (22) Look after (23)Bring up (24)Get off (25)Cut down (26)Fall through (27) Work out (28)Shut down (29)Hand over (30) Pull down

Unit III Translation from English to Gujarati/Hindi	**Number of lectures: 8** **Weightage: 33%**
Unit IV Dialogue Writing	**Number of lectures: 4** **Weightage: 17%**

REFERENCES

1. High School English Grammar – Wrenn& Martin

2. Contemporary English Grammar – David Green

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	33	8
Unit II	17	4
Unit III	33	8
Unit IV	17	4
Total	**100**	**24**

GENERIC ELECTIVE

EGC-501

Environment Science and Disaster Management

RATIONALE OF STUDY: To learn about the area of environment science with selection of elective paper. This paper is designed to enable students to acquire basic understanding of the environment, environmental disasters and its management. It also provides information about mitigation methodology for the environmental disasters. It also gives information about psychological health and mental therapies and social awareness.

LEARNING OUTCOMES:

The students will learn about the basic concepts of environmental disasters, pre disaster management and post disaster management, and social awareness.

TEACHING & EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of their regular attendance in classroom & external (50 marks) university examination.

Course	Title	Credit	Theory (hrs/week)	External	Internal	Total
ECG-501	Environment Science and Disaster Management	2	2	50	-	50

COURSE CONTENT

Unit I **Number of lectures: 12**
Weightage: 50%

- Introduction to Environment
- Global Environmental Issues: Climate Change, Ozone layer depletion, Global Warming
- National Environmental issues: Water Pollution Management, Air Pollution, Vehicular pollution management, E-waste, Desertification Issues, Wild Life and Forest Management
- EIA (Environment Impact Assessment)

Unit II **Number of lectures: 12**
Weightage: 50%

- General concept of disaster management: Introduction, Primary concept, from management to mitigation of disaster
- risk assessment and vulnerability analysis
- public awareness and training,
- Causes and effects of disaster
- Pre disaster management: various steps/arrangement during pre-disaster management.
- Management during disaster and post disaster: earth quake, drought, diseases, flood,

cyclones, land slide,.

REFERENCES:

1. Modi C D & others (2006) Paryavaran and AapattiVyavasthapan [Gujarati], Swami prakashan, Patan-384265
2. Patel J C (2006) Paryavaran and disaster management [Gujarati], Parshwa publication, Ahmedabad-380001
3. ErachsBharucha (2008, first edition) ParyavaranAdhyayan [Gujarati], Orient
Longman Pvt. Ltd., Hyderabad.
4. Distributor: M/S Himanshu book company, 06-07 Shri JayendrapuriBhavan, Ellisbridge, New Sanyas Ashram, Ahmedabad – 380 006.
5. K RamanaMurthi, 2004 Disaster Management, Dominant Publishers and Di stributors, New Delhi - 110002

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

Instruments

Paper: EPH- 501 A

RATIONALE: This course is designed to enable students to acquire understanding about the basic principles of instruments used in physical science.

LEARNING OUTCOMES:

- Understand the working, handling and underlying principle of instruments.
- Develop an understanding of the various physical laws behind their working and its applications.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EPH- 501 A	Instruments	2	24	00	50	50

COURSE CONTENT

Unit – I **Number of lectures: 12**
Weightage: 50%

Michelson's Interferometer

Principle, Construction, Working, Circular fringes ,Localized fringes, White light fringes, Visibility of fringes, Applications of Michelson Interferometer-Measurement of wavelength, Determination of difference in the wavelengths of two waves, Thickness of a thin transparent sheet, Determination of the refractive index

Babinet Compensator

Construction, Production of polarized light, analysis of elliptically polarized light.

Unit - II **Number of lectures: 12**
Weightage: 50%

C.R.O.

CR Tube, Electrostatic Deflection Sensitivity, Magnetic Deflection

Sensitivity, CRT connections, Uses of C.R.O.

G. M. Counter

Principle, Construction, Working, Dead time, recovery time, True counting rate, Efficiency of counting, Quenching of G M counter, Operation and testing of G.M. counter, Plateau, Applications of GMC, Advantages and limitations of GMC.

REFERENCES:

1. A textbook of Optics by Dr.N.Subrahmanyam, Brijlal and Dr.M.N. Avadhanulu, S. Chand & Co. (for M.I, B.C.)
2. Hand Book of Electronics by Gupta and Kumar. 30th revised Edition 2002. (For CRO)
3. Refresher Course in Physics Vol-III, S. Chand & Co. Ltd.(7th edition-2006) (for GMC,Ch-28)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

Programming inFortran 90 and 95

Paper: EPH- 501 B

RATIONALE: This course is designed to enable students to acquire basic understanding of programming using Fortran 90 and 95 in physical science.

LEARNING OUTCOMES:

- Develop the logic, algorithms and writing corresponding codes in fortran.
- Develop the ability to solve basic numerical and logical problems by writing fortran programs.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EPH- 501 B	Programming in Fortran 90 and 95	2	24	00	50	50

COURSE CONTENT

Unit – I **Number of lectures: 12**
Weightage: 50%

Introduction, Evolution of Fortran 90, Writing a Program, Input Statement, Some Fortran 90 Program Examples, Constants, Scalar Variables, Declaring Variable names, Implicit Declaration, Named Constants

Unit - II **Number of lectures: 12**
Weightage: 50%

Arithmetic Operators and Modes of Expressions, Integer Expressions, Real Expressions, Precedence of Operations in Expressions, Examples of Arithmetic Expressions, Assignment Statements, Defining Variables, Some Problems due to Rounding of Real Numbers, Mixed Mode Expressions, Intrinsic Functions, Examples of use of Functions.

REFERENCES:

1.COMPUTER PROGRAMMING IN FORTRAN 90 AND 95 by V. Rajaraman (Sept.-2008)) PHI, New Delhi.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit I	50	12
Unit II	50	12
Total	100	24

Third Year B.Sc. (Physics)

Semester VI

	Subject code	Study components	Instructions Hrs / week	Examination			Credit
				Internal	University Exam	Total	
B.Sc. (Physics) Sem- VI	**CPH-601**	Mathematical Physics, Classical & Quantum Mechanics-II	3	30	70	100	3
	CPH-602	Modern Physics-III	3	30	70	100	3
	CPH-603	Modern Physics-IV	3	30	70	100	3
	CPH-604	Electronics and 'C' Programming-II	3	30	70	100	3
	PPH-601	Physics Practical	12		200	200	6
	EPH- 601 A **OR** **EPH- 601 B**	Remote Sensing & Transducers OR Nanotechnology & Nanomaterials	2		50	50	2
	EGC- 601	Advanced Communication Skills	2		50	50	2
	FCG-601	Basic English – VI	2	15	35	50	2
			30	135	615	750	24

Semester- VI

CPH 601- Mathematical Physics, Classical & Quantum Mechanics-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 601	Mathematical Physics, Classical & Quantum Mechanics-II	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

Mathematical Physics

- **(a) Curvilinear Coordinates**
  General Curvilinear coordinates, Vector operators in orthogonal Curvilinear Coordinates
  Note : The expressions for Divergence and curl are not to be derive but directly expressions are to be given (b) Second order differential Equations

  (b) Special Functions
  Legendre differential equation, Generating Function of Legendre Polynomial, Rodriguez's formula for Legendre Polynomial, Orthogonal properties of Legendre Polynomial, Hermite differential equation and Hermite Polynomial, Generating function of Hermite Polynomial, Recurrence formula for Hermite Polynomial, Rodriguez's formula for Hermite Polynomial.

Unit - II **Number of lectures: 15**
Weightage: 33%

CLASSICAL MECHANICS

Variational Principle: Lagrange's and Hamilton's Equations
Configuration space, Some techniques of calculus of variation, Applications of theVariationalprinciple, Hamilton's principle. Equivalence of Lagrange's and Newton's equations, Advantages of the Lagrangeian formulation-Electromechanical analogies, Lagrange's undetermined multipliers, Lagrange's equation for non- holonomic system, Application of the Lagrangeian method of undetermined multipliers, Hamilton's equations of motion, Some applications of the Hamiltonian formulation, Phase space, Comments on the Hamiltonian formulation.

UNIT - III **Number of lectures: 15**
Weightage: 33%

QUANTUM MECHANICS

- **(a) Exactly Soluble Eigen Value Problems : The simple harmonic Oscillator**
  The Schrödinger equation and energy Eigen values, The energy Eigen functions, Properties of Stationary States, The abstract operator method, Coherent States.
  (b) Angular Momentum and Parity
  The Angular momentum operators, TheEigenvalue equation for L:Separation of variables, Admissibility conditions on solutions:Eigen values, The Eigenfunctions: Spherical harmonics, physical interpretation, Parity.

REFERENCES:

1. Quantum Mechanics by Satya Prakash, PragatiPrakashan (Reprint-2008)
2. Mathematical Physics by B.D.Gupta.
3. Mathematical Physics by H.K.Dass.
4. Introduction to classical mechanics by Takawale and Puranic. THM Publication.
5. Classical Mechanics, by Goldstein. Narosa Publishing House, New Delhi.
6. Classical Mechanics by YasvantWaghmare.
7. Classical Mechanics by N.C.Rana and P.S.Joag, THM9. Atomic Physics by J.B.Rajam (5th Edition-1960) S. Chand & Co.
8. A text book of Quantum Mechanics by P.M. Methews and K. Venkateshan, THM.

9. Quantum Mechanics by Ghatak and Loknathan, The Macmillan Company of India Limited.
10. Quantum Mechanics by Fschwabi, Narosa Publishing House, New Delhi.
11. Quantum Mechanics by John, L. Powell and B. Crasemann.
12. Quantum Mechanics by Schiff.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- VI

CPH 602- ModernPhysics-III

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 602	Modern Physics-III	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

STATISTICAL MECHANICS

- **(a) Some Application of Statistical Mechanics**

Thermodynamics, Reversible and Irreversible processes, The Laws of Thermodynamics ((i) Zeros (ii) First Law (iii) Second Law), Statistical interpretation of the basics thermodynamic variables, Thermodynamic functions in terms of grand partition function, Ideal gas, Gibbs's Paradox (Inclusive Sackur-Tetrode equation), The equipartition theorem.

- **(b) B.E. and F.D. distribution**

Symmetry of wave function, The quantum distribution functions, The Boltzmann limit of Boson and Fermion gases, Evaluation of partition function, Partition function for Diatomic molecules, Equation of state for an ideal gas, The quantum mechanical paramagnetic susceptibility.

Unit - II **Number of lectures: 15**
Weightage: 33%

SOLID STATE PHYSICS

Superconductivity :

Phenomena without observable Quantization, Zero resistance and persistent currents, Perfect Diamagnetisms : Meissner Effect, London Equation, Critical Field : Type I and Type II super conductors, BCS Theory : A qualitative approach, Cooper pair formation, BCS ground state, Important predictions of the BCS theory and comparison with experiments, Critical temperature, Ginzburg-Landau Theory, Magnetic flux Quantization, Coherence Length, Type-II superconductivity, Josephson tunneling, Applications.

UNIT – III **Number of lectures: 15**

Weightage: 33%

Holography and Fiber Optics

- **(a) Holography**

Introduction, Principle of Holography, Theory, Important properties of Hologram, Advances, Applications.

- **(b) Fiber Optics**

Introduction, Optical Fiber, Critical angle of Propagation, Modes of Propagation, Acceptance angle, Fraction of refractive index, Numerical aperture, Types of optical fiber, Normalized frequency, Pulse dispersion, Attenuation, Applications, Fiber optic Communication system, Advantages.

REFERENCES:

1. Fundamentals of Statistical Mechanics by B. B. Laud. New Age International Publisher (copy right 1998)
2. Statistical Mechanics and Properties of Matter by E.S.R.Gopa
3. Statistical Mechanics by B. K. Agarwal- Melvin Eisner. NewAge Int. Pub.
4. Elements of Solid State Physics by J.P. Srivastava,PHI New Delhi (2003)
5. Introduction to Solid State Physics by C. Kittel. 7th Edition, John Willy and Sons
6. Solid State Physics by Saxena. PragatiPrakashan.
7. Solid State Physics by C. M. Kachhawa.
8. A textbook of Optics by Dr.N.Subrahmanyam, Brijlal and Dr.M.N. Avadhanulu, S. Chand & Co.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	**Examination Scheme %Weightage**	**Teaching Scheme No. of Lecture**
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- VI

CPH 603- ModernPhysics-IV

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 603	Modern Physics-IV	3	45	30	70	100

COURSE CONTENT

Unit – I **Number of lectures: 15**
Weightage: 34%

ELECTROMAGNETICS

Boundary Value Problems in Electrostatic Fields :Special Techniques

Laplace's Equation, Introduction, Laplace's Equation in two dimensions, Laplace's Equation in three dimensions, Boundary conditions and Uniqueness theorems, The method of images, The classic image problem, Induced surface charge, Force and energy, other image problems, Separation of variables, Cartesian Coordinates, Spherical coordinates, Multipole Expansion, Approximate Potential at large distances, The monopole and dipole terms, Origin of Coordinates in multipole Expansions.

Unit - II **Number of lectures: 15**
Weightage: 33%

ELECTROMAGNETICS

- **Electromagnetic Induction:**

Faraday's law, The Induced Electric Field, Maxwell's Equation :

Electrodynamics before Maxwell, How Maxwell fixed Ampere's Law, Maxwell's Equations, The Potential Formulation : Scalar and Vector Potentials, Gauge Transformations, Coulomb Gauge and Lorentz Gauge

- **(b) Electromagnetic Waves:**

Electromagnetic Waves in Vacuum: The Wave equation for E and B, Energy and Momentum in Electromagnetic Waves, Electromagnetic Waves in Matter: Propagation in Linear Media, Electromagnetic Waves in conductors, The frequency dependence of permittivity.

UNIT – III **Number of lectures: 15**

Weightage: 33%

ENERGY TECHNOLOGY

- **Fundamentals and Applications of Solar Energy**

Introduction, Applications, Essential subsystems in a Solar energy plant , Solar energy chains (routes) and their prospects, Terms and definitions of some basic entities, Units of solar power and solar energy. Merits and Limitations of Solar energy conversion and utilization. Energy from the Sun, Solar constant.

- **(b) Solar energy conversion systems and thermal power plants:**

Solar thermal power supply system for space station, Solar energy from satellite station through microwaves to Earth station, Solar thermoelectric power.

Solar photovoltaic systems: V-I characteristics of a solar cell, Inter connections of solar cell, Efficiency of solar cell.

REFERENCES:

1.Introduction to Electrodynamics by David J. Griffiths. 3rd EditionPearson Education Asia.

2. Electromagnetics by B. B. Laud. Willley Eastern Ltd.

3. Energy Technology by S. Rao and Dr. B. B. Parulekar. Khanna Publisher, Delhi. 1st edition 1985.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester- VI

CPH 604- Electronics and 'C' Programming-II

RATIONALE: This course is designed to enable students to acquire basic understanding of the basic principles of physics.

LEARNING OUTCOMES:

- Understand the concept of physical sciences.
- Develop an understanding of the various physical laws and its applications.
- Gain knowledge about the physics existing in and around the society.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 30 marks and End Term Examination conducted by University examination for 70 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
CPH- 604	Electronics and 'C' Programming-II	3	45	30	70	100

COURSE CONTENT

Unit - I **Number of lectures: 15**
Weightage: 34%

Feedback Amplifier
Feedback, Principle of Feedback Amplifiers, Advantages of Negative Feedback, Reasons for Negative Feedback.

Transistor Oscillators (Sinusoidal):
Tuned Collector Oscillators, Hatley Oscillator, Colpitt's Oscillators (Circuit operation and alternative treatment only), Phase Shift oscillator, R-C- Oscillator, Wien Bridge Oscillator, Crystal Oscillator.

Unit - II **Number of lectures: 15**
Weightage: 33%

Modulation

Introduction, Expression for Amplitude modulated voltage, Wave form Amplitude modulated voltage, Side band produced in Amplitude modulated wave,Modulated power output, Frequency Modulation,

Frequency deviation and carrier swing, Modulation index, Expression for frequency modulated wave, Phase modulation

Digital Electronics

Simplification using Karnaugh Maps (Complete), Don't Care Conditions, BCD-to-7 Segment Decoder, Digital Comparator, Multiplexer, De multiplexer.

UNIT - III **Number of lectures: 15**

Weightage: 33%

Programming in C

- **(a) Operators and Expressions**

Introduction, Operators: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional, Bitwise, Special Arithmetic Expressions, Evolution of Expressions, Precedence of Arithmetic Operators, Some Computational Problems,Type Conversion in Expressions, Operator Precedence and Associatively, Mathematical Functions.

- **(b) Managing Input and Output Operations**

Introduction, Reading and writing a Character, Formatted Input and Output

- **(c) Decision making and branching**

Introduction, Decision making with if statement, simple if statement, The if----else statement, Nesting of if---else statement, The else if ladder, The switch statement, The ? : operator, The Goto statement.

REFERENCES:

1.Hand book of Electronics by Gupta & Kumar 30th Revised Edition, (2002) PragatiPrakashan
2. Electronics and Radio Engineering by M. L. Gupta. 9th Enlarged Edition reprint 2002. (Dhanpat Rai Publication Co.)
3. Hand Book of Electronics by Gupta and Kumar. 30th revised Edition 2002.
5. Programming in ANSI 'C' by E.Balaguruswami (Ch:3,4) (THM) (3rd Edition)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	34	15
Unit II	33	15
Unit III	33	15
Total	100	45

Semester VI

PPH 601- Physics Practical

RATIONALE: This course is designed to enable students to acquire on hand basic understanding of the physical phenomena, fundamental laws of physics, as well as on hand experience of handling the various instruments which have much use in industries as well as in research institutes. These experiments make the students capable and competent to work in physics related industries and research institutes

LEARNING OUTCOMES:

- Understand the basic principles and of physics.
- Develop an understanding about the handling of various instruments.
- Develop an analytical attitude for physical laws through simple and basic experiments.
- Gain knowledge and expertise in experimental physics field.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. General viva-voce will be conducted to analyse the knowledge of the student.

Subject Code	Subject Title	Credits	Practical		Total Marks
			Hrs.	Max Marks	
PPH- 601	Physics Practical	6	12	200	200

Laboratory Course

LIST OF EXPERIMENTS

Group-1 (Non-circuitry III)

1. Young modulus ‘y’ by Koening method.
2. Optical Lever
3. Viscosity by Log decrement
4. I-V Characteristic of solar cell and determination of F.F, V.F. &n.
5. G.M. Counter (Comparison of Intensities)

Group-2 (Non-circuitry IV)

1. To determine air gap 't' between two plates of F.P. Etalon and determination of wavelength ' λ ' of monochromatic light
2. Temperature of Flame
3. Newton's Ring (Determination of Wave length of Light).
4. To determine λ and dλ of sodium light using Michelson interferometer
5. Determination of wavelength of light by Lloyd's mirror

Group-3 (Circuitry III)

1. Mutual induction 'M' of two coil using B.G.
2. High resistance 'R' using leakage method
3. Maxwell's Bridge
4. Solenoid Inductor
5. Susceptibility of $FeCl_3$ using Quienk's method

Group-4 (Circuitry IV)

1. A study of transistorized Colpit's oscillator using CRO/Wave meter
2. Negative Feedback Amplifier
3. A study of Half subtractor and Full subtractor
4. To determine frequency of AFO using Wein bridge
5. Use of Computer- Programming in 'C' language.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

Semester VI

Pattern of University Practical Exam

Time: 10:30am to 6:00pm (Including 30 minutes recess) Total Marks: 200

First Day

(A) Group-1 (35 marks)
(B) Group-2 (35 marks)

- ✓ Any one experiment to be performed from each group of experiments.
- ✓ **Evaluation Scheme:**
  - Aim / Apparatus - 2 marks
  - Diagrams/ Circuit Diagrams - 5 marks
  - Observation Tables - 15 marks
  - Calculations / Plots - 10 marks
  - Results, Discussion & Conclusion - 3 marks

(C) Viva- Voce on practical base (24 marks)

- ✓ **Evaluation Scheme:**
  - Group-1 - 12 marks
  - Group-2 - 12 marks

Second Day

(A) Group-3 (35 marks)
(B) Group-4 (35 marks)

- ✓ Any one experiment to be performed from each group of experiments.
- ✓ **Evaluation Scheme:**
  - Aim / Apparatus - 2 marks
  - Diagrams/ Circuit Diagrams - 5 marks
  - Observation Tables - 15 marks
  - Calculations / Plots - 10 marks
  - Results, Discussion & Conclusion - 3 marks

(C) Viva- Voce on practical base (24 marks)

- ✓ **Evaluation Scheme:**
  - Group-3 - 12 marks
  - Group-4 - 12 marks

Journal (12 marks)

Note: Certified practical journal is compulsory for practical exam.

FCG601-BasicEnglish–VI

RATIONALE: Thiscourseisdesignedtoenablestudentstoacquirebasicunderstandingof Englishgrammar.Thecoursewouldhelpstudentstofortify theirknowledgeofEnglishand strengthen theirbasiccommunication abilities.

LEARNINGOUTCOMES:

- Understand the functions and usage of sentence framing, sentence correction and synthesis the sentences
- Develop language skills of reading through filling in appropriate words in blanks, correctingerrors,choosing correctforms, etc.
- Acquireinterest in English language and literaturethroughtextbook lessons.
- Acquirewriting skill through developing story.
- Acquirethe speaking skill through speeches.

TEACHINGANDEVALUATIONSCHEME:Theobjectiveofevaluationisnotonly to measure the performanceof students,butalsotomotivate themfor betterperformance.Students areevaluatedonthebasisofMidTermexaminationsfor15marksandEndTermExamination conducted byUniversityexamination for 35marks.

Subject Code	Subject Title	Credits	Theory			TotalMarks
			Hrs.	Max Marks		
				MidTerm	EndTerm	
FCG-602	Basic English-VI	2	24	15	35	50

Unit-I **Number of lectures: 8**
Weightage: 33%

Lesson2 :*Between the Mosque*

Lesson 7 :*My Financial Career*

Lesson 8 : *Speech on Indian Independence*

Poem 14 : *The World is Too Much with us*

Poem 15 :*Success is Counted Sweetest*

Poem 16 :*I, Too, Sing America*

The Joy of Reading selected Prose & Poetry

Unit- II **Number of lectures: 4**
Weightage: 17%

Grammar

- Transformation , Correction (Articles, prepositions, Tenses, Concord)
- Synthesis of Sentences

Unit-III **Number of lectures: 8**
Weightage: 33%

Developing a Story

Unit-IV **Number of lectures: 4**
Weightage: 17%

Preparing Speeches

- Introducing Chief Guest
- Farwell Speech
- Speech on annual functions
- Mourning the Death of VIP
- Speech on Republic Day

REFERENCES

1. High School English Grammar – Wrenn& Martin
2. ContemporaryEnglish Grammar– David Green

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, Question Banks, References and Reprints / Copy of Articles, Models, Diagrams
4. Assistance in solving of questions from our question bank.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	33	8
Unit II	17	4
Unit III	33	8
Unit IV	17	4
Total	**100**	**24**

GENERIC ELECTIVE

EGC601-Advanced Communication Skills

RATIONALE: This course is designed to enable students to acquire basic understanding of Phonetics. The students would be made familiar with the stress, punctuation and fluency of English words and sounds. The course would help students to know the sentence patterns and grammatical structures.

LEARNING OUTCOMES:

- To build confidence for communicating in English and create interest for the life-long learning of English language
- To describe and characterize spoken English both from the grammatical and the discourse perspectives.
- To describe guidelines and identify the difficulties Indian students and users of English as a foreign language have in the use of the English language in oral contexts.
- To draw comparisons between oral and written language through the use of representative oral and written language.

TEACHING AND EVALUATION SCHEME:

The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of Mid Term examinations for 15 marks and End Term Examination conducted by University examination for 35 marks.

Subject Code	Subject Title	Credit	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EGC - 601	Advanced Communication Skills	2	24	15	35	50

COURSE CONTENT

Unit- I	**Number of lectures: 12** **Weightage:50%**
Basics of Listening: (a) Listening Ability (b) Hearing and Listening (c) Types of Listening (d) Barriers to Effective Listening	
Unit- II	**Number of lectures: 12** **Weightage:50%**
Writing Skills: (a) Resume writing (Application Que) (b) Business Letters (Application Que) (c) Report Writing (Application Que) (d) E-mail etiquettes	

RECOMMENDED READING:

1. V. Sasikumar : A Course in Listening and Speaking – I, Cambridge Uni. Press
2. G. Taylor:English Conversation Practice, Tata Mcgraw-Hill Publishing Co. Ltd.
3. Wrenn&Martin:High School English Grammar & Composition, S, Chand Pub.
4. Kumar S and Lata P Communication Skills 2011: New Delhi Oxford University Press

INSTRUCTION STRATEGIES

1. Interactions with the students to understand the level of students.
2. Explaining & discussing English language structures.
3. Teaching the topics included in the syllabus with the help of teaching aids like OHP, LCD (Power point presentation), Notes, References, Copy of Articles, Models, diagram.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

Remote Sensing and Transducers

Paper: EPH- 601 A

RATIONALE: This course is designed to enable students to acquire understanding about the basic principles of Remote Sensing and Transducers.

LEARNING OUTCOMES:

- Develop an understanding of the various physical laws behind remote sensing and its applications.
- Understand the working, handling and underlying principle of transducers.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EPH- 601 A	Remote Sensing and Transducers	2	24	00	50	50

COURSE CONTENT

Unit-I **Number of lectures: 12**
Weightage: 50%

- **Remote Sensing**

Introduction, Beginning of Remote Sensing in India, History, Electromagnetic energy, Visible and non-visible radiation, Emission of EM radiation, Atmospheric effect, Solar constant Remote Sensing-a developing Science: Atmospheric Window, Human vision and Human Eye, Useful instruments, Micro-resolution, Photo-geometry.
New Technology: Detectors, Optical Sensors, Types of Optical Sensors, Optical mechanical sensor, Scanning radiometer, IR Scanner, Multi-spectra Scanner. TV, Radar and Slar systems, Applications of RS in different fields –Land set satellites, Earth resource satellites

Unit - II **Number of lectures: 12**
Weightage: 50%

- **Transducers**

What is Transducers? , Classification of Transducers, Classification based on electrical principle involved, Resistive Position Transducers,

	Resistive Pressure Transducer, Linear Variable Differential Transducer, Piezoelectric Transducer, Strain gauze Transducer, Temperature Transducers, Resistance temperature Detector, Thermistor, Thermocouple, Various types of Microphones, Carbon microphones, Ribbon microphones, Loudspeaker, Moving coil microphones.

REFERENCES:

1. Remote Sensing by Suresh Shah (in Gujarati) Uni. GranthNirman Board, Ahmedabad. 2. Introduction to Optical Remote Sensing by P. S. Phisaroty (ISRO-Banglore).
2. Basic Electronics (solid state) by B. L. Tharaja , Pub. S. Chand &Company (5th Edition)

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

Subjective Elective

Nanotechnology and Nanomaterials

Paper: EPH- 601 B

RATIONALE: This course is designed to enable students to acquire basic understanding of Nanotechnology and Nanomaterials as the frontier area of research in physical science.

LEARNING OUTCOMES:

- To acquire the basic understanding of Nano science and Nano technology.
- Develop the understanding about Nano materials.

TEACHING AND EVALUATION SCHEME: The objective of evaluation is not only to measure the performance of students, but also to motivate them for better performance. Students are evaluated on the basis of End Term Examination conducted by University examination for 50 marks.

Subject Code	Subject Title	Credits	Theory			Total Marks
			Hrs.	Max Marks		
				Mid Term	End Term	
EPH- 601 B	Nanotechnology and Nanomaterials	2	24	00	50	50

COURSE CONTENT

Unit – I **Number of lectures: 12**

Weightage: 50%

- **BASICS AND APPLICATION OF NANOTECHNOLOGY**

General introduction, Basic idea of nanomaterials, Types of nanomaterials: 0-D, 1-D, 2-D, and Special nanomaterials. Nanoscale size effect, Surface area to volume ratio, Brief explanation of properties of nanomaterials (magnetic, electrical, mechanical, and optical), Mention of applications of nanomaterials.

Nanotechnology - Health, environment and society:

- ✓ **Health impact:** medical applications to cure disease, and the health hazards.
- ✓ **Environmental impact:** Nanopollution, Environmental benefits of nanotechnology, e.g. energy, water filtration and remediation.
- ✓ **Societal impact:** Implications of nanotechnology on society, Issues with Nanotechnology, Nano-policies and institutions, Nanotech and war, Public perception and public involvement in the nan discourse.

Unit - II **Number of lectures: 12**

Weightage: 50%

- **PREPARATION OF NANOMATERIALS**

Physical methods: Ball milling, Inert gas condensation, Arc discharge, Ion

	sputtering, Laser ablation, Spray pyrolysis, Flame pyrolysis, Thermal evaporation, Pulsed laser deposition, Molecular beam epitaxy. **Chemical methods:** Metal nanocrystals by reduction, Solvothermal synthesis, Photochemical synthesis, Electrochemical synthesis, Micelles and Microemulsions, Chemical vapour deposition (CVD), Sol-gel process. **Lithographic techniques:** Photolithography, Electron beam and Focused ion beam lithography. [Brief explanation for each]

REFERENCES:

1. Pradeep T., "A Textbook of Nanoscience and Nanotechnology", Tata McGraw Hill Education Pvt. Ltd., 2012.

INSTRUCTION STRATEGIES

1. Explanation of Principles, protocols, expected result trends, handling of instruments and equipments, precautions and safety measures in class and demonstration of important steps.
2. Monitoring of the students performing the experiments.
3. Evaluation of results of each experiment.

TEACHING AND EXAMINATION

UNIT	Examination Scheme %Weightage	Teaching Scheme No. of Lecture
Unit I	50	12
Unit II	50	12
Total	100	24

EXAMINATION PATTERN

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR

B.Sc. Physics, Semester V/VI, End Term Examination,

Month-Year

Subject: Code-Title

Time: 3 hrs **Date** **Maximum marks: 70**

Que. No : 1	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 2	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 3	(A) : Write any Two out of Three Questions (B) : Write any One out of Two Questions	12 Marks 08 Marks
Que. No : 4	Write any Ten out of Twelve (Four questions to be asked from each unit) Short question/MCQ/Short numerical/Diagram/Match the following, True or False, Fill in the blanks	10 Marks
Total marks		70 marks

KADI SARVA VISHWAVIDYALAYA, GANDHINAGAR
B.Sc. Semester V/VI, END TERM Examination,
Month-Year
Subject: Subjective Elective/Generic Elective

Time: 2 hrs **Date**

Maximum marks: 50

Que. No : 1	Attempt any three out of Four (Descriptive)	21 Marks
Que. No : 2	Attempt any Four out of six (Short Notes)	20 Marks
Que. No : 3	Attempt any Three out of Four (Very Short Answers)	09 Marks
Total marks		50 marks