C. U. SHAH UNIVERSITY

WADHWAN CITY

FACULTY OF SCIENCES

B.Sc.

(PHYSICS)

SEM – VI

Syllabi (CBCS) of Physics WEF June 2016

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Quantum Mechanics **SUBJECT CODE: 4SC06QUM1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Quantum Mechanics.

Prerequisites:-Fundamental knowledge of Quantum Mechanics.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Time dependent Schrodinger equation** Time dependent Schrodinger equation and dynamical evolution of a quantum state, Properties of Wave Function, Interpretation of Wave Function Probability and probability current densities in three dimensions, Conditions for Physical Acceptability of Wave Functions, Normalization, Linearity and Superposition Principles, Eigenvalues and Eigen functions, Position, momentum & Energy operators, commutator of position and momentum operators, Expectation values of position and momentum. Wave Function of a Free Particle. **Time independent Schrodinger equation** Hamiltonian, stationary states and energy eigenvalues, expansion of an arbitrary wave function as a linear combination of energy Eigen functions, General solution of the time dependent Schrodinger equation in terms of linear combinations of stationary states	20
2	**General discussion of bound states in an arbitrary potential** Continuity of wave function, boundary condition and emergence of discrete energy levels, application to one-dimensional problem-square well potential, Quantum mechanics of simple harmonic oscillator-energy levels and energy Eigen functions using Frobenius method. **Quantum theory of hydrogen-like atoms** Time independent Schrodinger equation in spherical polar coordinates, separation of variables for the second order partial differential equation, angular momentum operator and quantum numbers, Radial wave functions from Frobenius method, Orbital angular momentum quantum numbers l and m; s, p, d,.. shells (idea only)	18

3	**Atoms in Electric and Magnetic Fields** Electron Angular Momentum, Space Quantization, Electron Spin and Spin Angular Momentum, Larmor's Theorem, Spin Magnetic Moment, Stern-Gerlach Experiment, Zeeman Effect: Electron Magnetic Moment and Magnetic Energy, Gyromagnetic Ratio and Bohr Magneton.	12
4	**Atoms in External Magnetic Fields:** Normal and Anomalous Zeeman Effect. **Many electron atoms:** Pauli's Exclusion Principle, Symmetric and Antisymmetric Wave Functions, Periodic table, Fine structure, Spin orbit coupling, Spectral Notations for Atomic States, Total Angular Momentum, Vector Model, Spin-orbit coupling in atoms-L-S and J-J couplings.	10

Learning Outcomes:- After successful completion of this course, students have:

- Knowledge of Quantum Mechanics.

Books Recommended:-

1. 'A Text Book of Quantum Mechanics', **P. M. Mathews and K. Venketeshan**, *Tata McGraw Hill*.
2. 'Quantum Mechanics: Theory and Applications', **A. Ghatak and S. Lokanathan**, *MacMillan India Ltd*.
3. 'Quantum Mechanics', **F. Schwabl**, *Narosa Publishing House.*
4. 'Quantum Mechanics', **G. Aruldhas**, *Prentice-Hall of India.*
5. 'Introduction to Quantum Mechanics', **David J Griffiths**, 2nd Ed., *Pearson.*
6. 'Quantum Mechanics', **Leonard I. Schiff**, *McGraw Hill Book Co.*
7. 'Quantum Mechanics', **Robert Eisberg and Robert Resnick**, 2nd Ed., *Wiley*.
8. 'Quantum Mechanics', **Bruce Cameron Reed**, *Jones and Bartlett Learning*.
9. 'Quantum Mechanics for Scientists and Engineers', **D. A. B. Miller**, *Cambridge Univ. Press*.
10. 'Quantum Mechanics', **Eugen Merzbacher**, *John Wiley and Sons, Inc.*
11. 'Quantum Mechanics', **Walter Greiner**, 4th Ed., *Springer*.

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopaedia of Science (D. K. Multimedia).
3. Physics Encyclopaedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopaedia Britannica-2008.

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Particle and Nuclear Physics **SUBJECT CODE: 4SC06PNP1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Particle and Nuclear Physics.

Prerequisites:-Fundamental knowledge of particle and nuclear Physics.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Particle physics:** Particle interactions, basic features, types of particles and its families. Symmetries and Conservation Laws: energy and momentum, angular momentum, parity, baryon number, Lepton number, Isospin, Strangeness and charm, concept of quark model, colour quantum number and gluons.	15
2	**Radioactivity decay:** (a) Alpha decay: basics of α-decay processes, theory of α-emission, Gamow factor, Geiger Nuttall law, α-decay spectroscopy, (b) β-decay: energy kinematics for β-decay, positron emission, electron capture, neutrino hypothesis, (c) Gamma decay: Gamma rays emission & kinematics, internal conversion.	12
3	**Nuclear Reactions:** Types of Reactions, Conservation Laws, kinematics of reactions, Q-value, reaction rate, reaction cross section, Concept of compound and direct reaction, resonance reaction, Coulomb scattering (Rutherford scattering). **Interaction of Nuclear Radiation with matter:** Energy loss due to ionization (Bethe-Block formula), energy loss of electrons, Cerenkov radiation, Gamma ray interaction through matter, photoelectric effect, Compton scattering, pair production, neutron interaction with matter.	18
4	**Detector for Nuclear Radiations:** Gas detectors: estimation of electric field, mobility of particle, for ionization chamber and GM Counter. Basic principle of Scintillation Detectors and construction of photo-multiplier tube (PMT). Semiconductor Detectors (Si and Ge) for charge particle and photon detection (concept of charge carrier and mobility). **Particle Accelerators:** Accelerator facility available in India: Van de Graff generator (Tandem accelerator), Linear accelerator, Cyclotron, Synchrotrons.	15

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of Nuclear Physics, Nuclear reaction and their applications and Particle Physics.

Books Recommended:-

1. 'Electromagnetics', **B. B. Laud**, *2nd Edition, Wiley Eastern Ltd.*
2. 'Introduction to Electrodynamics', **David J. Griffiths**, *Prentice Hall of India.*
3. 'Nuclear Physics - An Introduction', **S. B. Patel**, *New Age International*.
4. 'Introduction to Nuclear Physics', **H. Enge**, *Addison Wesley Pub. Com.*
5. 'Nuclear Physics', **D. C. Tayal**, *Himalaya Publisher.*
6. 'Modern Physics', **Kenneth Krane**, *John Wiley and Sons.*
7. 'Nuclear Physics', **Irvin Kaplan**, 2nd Edition, *Addison Wesley Pub. Com*.
8. 'Nuclear Physics', **S. N. Ghoshal**, *S. Chand and Company Ltd.*
9. 'Introductory Nuclear Physics', **Kenneth S. Krane**, *Wiley India Pvt. Ltd*.
10. 'Concepts of Nuclear Physics', **Bernard L. Cohen**, *Tata McGraw Hill*.
11. 'Basic Ideas and Concepts in Nuclear Physics - An Introductory Approach' **K. Heyde**, *IOP Publishing*.
12. 'Theoretical Nuclear Physics', **J. M. Blatt and V. F. Weisskopf**, *Dover Pub. Inc*.

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

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3. Physics Encyclopaedia.
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5. Encyclopaedia Britannica-2008.

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Statistical Mechanics and Plasma Physics

SUBJECT CODE: 4SC06SMP1

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Statistical Mechanics and Plasma Physics.

Prerequisites:-Fundamental knowledge of Statistical Mechanics and Plasma Physics.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Microcanonical Ensemble** Microcanonical distribution, Microcanonical average, Equal a priori probability, Additive property of entropy, Entropy of a perfect gas in a Microcanonical ensemble, Gibbs paradox, Removal of Gibbs paradox, Thermodynamic quantities in a Microcanonical ensemble, Average energy per particle, Specific heat at constants volume, Sackur-Tetrode formula, Nernst's heat theorem.	15
2	**Canonical Ensemble** Canonical distribution, Canonical average, Canonical partition function, Maxwell-Boltzmann distribution of velocities, Maxwell-Boltzmann distribution of absolute velocity, Most probable velocity, Mean kinetic energy, Thermodynamic quantities in a canonical ensemble, Equivalence of Microcanonical and canonical ensembles. **Grand Canonical Ensemble** Grand Canonical distribution, Grand Canonical average, Grand Canonical partition function, Thermodynamic quantities in a Grand canonical ensemble.	20
3	**Three Distributions** Maxwell-Boltzmann Distribution, Fermi-Dirac distribution, Bose-Einstein Distribution, Entropy of the gas, Evaluation of b, Evaluation of a, Condition for applicability of MB distribution. **Applications of Maxwell-Boltzmann Distribution** Energy distribution function, Energy distribution law, Partition function, Most probable energy, Total number of particles, Average energy, Velocity distribution function, Total number of particles, Most probable velocity, Average velocity and Root mean square velocity.	15

4	**Plasma Physics** Introduction, Interaction of Particles, Concept of Collisions, Excitation of Atoms and Molecules, Dissociation of Molecules, Ionization of Atoms and Molecules, Recombination and Photo Ionization, Excitation and Ionization by stages, Production of Plasma, Plasma Oscillations, Properties of Plasma, Plasma Radiation, Applications of Plasma.	10

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of Statistical Mechanics and Plasma Physics.

Books Recommended:-

1. 'Statistical Mechanics', **B.K. Agarwal and Melvin Eisner**, *Wiley Eastern*.
2. 'Fundamental of Solid State Physics', **B. S. Saxena, R. C. Gupta and P. N. Saxena**, *Pragati Prakashan*.
3. 'Fundamentals of Statistical Mechanics' **B. B. Laud,** *New Age International Publishers*.
4. 'Elementary Statistical Mechanics', **S. L. Gupta and V. Kumar**, *Pragati Prakashan*.
5. 'A textbook of Statistical Mechanics', **Suresh Chandra**, *CBS Publishers*.
6. 'Concepts of Modern Physics', **Arthur Beiser**, *Tata McGraw Hill*.
7. 'A Treatise on Heat Including Kinetic Theory of Gases, Thermodynamics and Recent Advances in Statistical Thermodynamics', **Meghnad Saha and B. N. Srivastava**, *Indian Press*, (1969).
8. 'Thermodynamics, Kinetic Theory, and Statistical Thermodynamics', **Francis W. Sears and Gerhard L. Salinger,** *Narosa Publication.*
9. 'Elements of Plasma Physics', **S. N. Goswami**, *New Central Book Agency (P) Ltd*.
10. 'Introduction to Plasma Physics', **F. F. Chen**, 2nd Ed., *Plenum Press*.

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopaedia of Science (D. K. Multimedia).
3. Physics Encyclopaedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopaedia Britannica-2008.

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Sensor Technology **SUBJECT CODE: 4SC06SNT1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			Total Marks
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Transducer elements.
- To expose the student knowledge of Pressure measurements related transducers.
- To expose the student knowledge of Temperature measurements related transducers.
- To expose the student knowledge of Acoustic Measurement and Optical Fibre Sensors.

Prerequisites:-Fundamental knowledge of Instrumentation and Sensors.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Analog Transducers** Electromechanical Type Transducer, Potentiometric resistance type, Inductive Type, Capacitive Type, Piezo- Electric Transducer, Dynamic Characteristics of Piezo-Electric Transducers, Resistance Strain Gauges, Unbounded Strain Gauge, Bonded Strain Gauge, Resistance Strain Gauge Bridges, Balanced Bridge, Unbalanced Bridge, Ionization Transducers, Mechno-Electronic Transducer, Opto-Electrical Transducer, Photo-emissive Transducer, Photoconductive Transducer, Photo-voltaic Transducer.	15
2	**Digital Transducers** Frequency domain transducer, Electromagnetic frequency domain transducer, Opto-Electrical frequency domain transducer, vibrating string transducer **Pressure Measurements** Introduction, Moderate Pressure Measurements, Manometers, High Pressure Measurements, Low Pressure (Vacuum) measurements, McLeod Gauge, Thermal conductivity or Pirani Gauge, Ionization Gauge, Knudsen Gauge.	15
3	**Temperature Measurements** Measurements of Temperature, Non-Electrical Methods, Solid Rod Thermometer, Bimetallic Thermometer, Electrical Methods, Electrical Resistance Thermometer, Metallic Resistance Thermometers, Semiconductor Resistance Sensors, Thermoelectric Sensors, Thermoelectric materials, Radiation Methods, Total radiation pyrometer, Selective radiation pyrometer.	15

4	**Acoustic Measurement** Microphones, Capacitor type microphone, Piezo-electric crystal type microphone, Electrodynamic type microphone, Carbon microphone. **Miscellaneous Instruments** Measurements of environmental air pollution parameters, Orsat apparatus for exhaust gas analysis, Gas chromatography, Non-dispersive infrared gas analyzer, Smoke density measurements. **Optical Fibre Sensors** Optical Fibre Sensors, Advantages of Optical Fibre Sensors, Types of Optical Fibre Sensors, Biosensors, Smart Sensors.	15

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of Transducer elements.
- Knowledge of Pressure measurements related transducers.
- Knowledge of Temperature measurements related transducers.
- Knowledge of Acoustic Measurement and Optical Fibre Sensors.

Books Recommended:-

1. 'Instrumentation Measurement and Analysis', **B. C. Nakra and K. K. Chaudhary**, *Tata McGraw Hill Pub*.
2. 'Biomedical Instrumentation', **R. S. Khandpur**, *Tata McGraw Hill Pub*.
3. 'Basic Electronics (Solid State)', **B. L. Theraja**, *S. Chand and Company Ltd*.
4. 'Electronic Instrumentation and Measurement Techniques', **W. D. Cooper and A. D. Helfrick**, *Prentice-Hall of India Pvt. Ltd.*

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

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3. Physics Encyclopaedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopaedia Britannica-2008.

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FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Computational Physics **SUBJECT CODE: 4SC06COP1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Computational Physics, Scientific Programming, Latex and visualization.

Prerequisites:-Fundamental knowledge of Computational Science.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Algorithms and Flowcharts** Algorithm: Definition, properties and development. Flowchart: Concept of flowchart, symbols, guidelines, types. Examples: Cartesian to Spherical Polar Coordinates, Roots of Quadratic Equation, Sum of two matrices, Sum and Product of a finite series, calculation of sin (x) as a series, algorithm for plotting (1) lissajous figures and (2) trajectory of a projectile thrown at an angle with the horizontal.	15
2	**Scientific Programming** Development of FORTRAN, Basic elements of FORTRAN: Character Set, Constants and their types, Variables and their types, Keywords, Variable Declaration and concept of instruction and program. Operators: Arithmetic, Relational, Logical and Assignment Operators. Expressions: Arithmetic, Relational, Logical, Character and Assignment Expressions. Fortran Statements: I/O Statements (unformatted/formatted), Executable and Non-Executable Statements, Layout of Fortran Program, Format of writing Program and concept of coding, Initialization and Replacement Logic, Examples from physics problems.	15
3	**Control Statements** Types of Logic (Sequential, Selection, Repetition), Branching Statements (Logical IF, Arithmetic IF, Block IF, Nested Block IF, SELECT CASE and ELSE IF Ladder statements), Looping Statements (DO-CONTINUE, DO-ENDDO, DOWHILE, Implied and Nested DO Loops), Jumping Statements (Unconditional GOTO, Computed GOTO, Assigned GOTO) Subscripted Variables (Arrays: Types of Arrays, DIMENSION Statement, Reading and Writing Arrays), Functions and Subroutines (Arithmetic Statement Function, Function Subprogram and Subroutine), RETURN, CALL, COMMON and EQUIVALENCE Statements), Structure, Disk I/O Statements, open a file, writing in a file, reading from a file, Examples from physics problems.	15

4	**Visualization** Introduction to graphical analysis and its limitations, Introduction to Gnuplot, Importance of visualization of computational and computational data, basic Gnuplot commands: simple plots, plotting data from a file, saving and exporting, multiple data sets per file, physics with Gnuplot (equations, building functions, user defined variables and functions), Understanding data with Gnuplot.	15

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of Computational Physics, Scientific Programing and Latex and visualization.

Books Recommended:-

1. 'Introduction to Numerical Analysis', **S. S. Sastry**, 5th Ed, *PHI Learning Pvt. Ltd*.
2. 'Computer Programming in Fortran 77', **V. Rajaraman**, *PHI Learning Pvt. Ltd*.
3. 'Gnuplot in action: understanding data with graphs', **Philip K Janert**, *Manning*.
4. 'Schaum's Outline of Theory and Problems of Programming with Fortran', **S. Lipsdutz and A. Poe**, *McGraw Hill Book Co*.
5. 'Computational Physics: An Introduction', **R. C. Verma, P. K. Ahluwalia and K. C. Sharma**, *New Age Inter. Pub*.
6. 'A first course in Numerical Methods', **U. M. Ascher and C. Greif**, *PHI Learning Pvt. Ltd*.
7. 'Elementary Numerical Analysis', **K. E. Atkinson**, 3rd Ed., *Wiley India Edition*.

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopaedia of Science (D. K. Multimedia).
3. Physics Encyclopaedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopaedia Britannica-2008.

C. U. SHAH UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Basic Instrumentation Skills **SUBJECT CODE: 4SC06BIS1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
4	0	0	4	4	30	1.5	70	3	--	--	--	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Basic Instrumentation Skills.

Prerequisites:-Fundamental knowledge of Basic Instrumentations.

Course outline:-

Sr. No.	Course Contents	Hours
1	**Basic of Measurements:** Instruments accuracy, precision, sensitivity, resolution range etc. Errors in measurements and loading effects. **Multimeter:** Principles of measurement of dc voltage and dc current, ac voltage, ac current and resistance. Specifications of a multimeter and their significance. **Electronic Voltmeter:** Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity. Principles of voltage, measurement (block diagram only). Specifications of an electronic Voltmeter/Multimeter and their significance. **AC millivoltmeter:** Type of AC millivoltmeters: Amplifier- rectifier, and rectifier-amplifier, Block diagram ac millivoltmeter, specifications and their significance.	15
2	**Cathode Ray Oscilloscope** Block diagram of basic CRO. Construction of CRT, Electron gun, electrostatic focusing and acceleration (Explanation only-no mathematical treatment), brief discussion on screen phosphor, visual persistence and chemical composition. Time base operation, synchronization. Front panel controls, Specifications of a CRO and their significance, Use of CRO for the measurement of voltage (dc and ac frequency, time period, Special features of dual trace, introduction to digital oscilloscope, probes. Digital storage Oscilloscope: Block diagram and principle of working.	15
3	**Signal Generators and Analysis Instruments** Block diagram, explanation and specifications of low frequency signal generators, pulse generator, and function generator, Brief idea for testing, specifications, Distortion factor meter, wave analysis. **Impedance Bridges & Q-Meters** Block diagram of bridge, working principles of basic (balancing type) RLC bridge, Specifications of RLC bridge, Block diagram & working principles of a Q-Meter, Digital LCR bridges.	15

4	**Digital Instruments** Principle and working of digital meters. Comparison of analog and digital instruments, Characteristics of a digital meter, Working principles of digital voltmeter. **Digital Multimeter** Block diagram and working of a digital multimeter, Working principle of time interval, frequency and period measurement using universal counter/frequency counter, time- base stability, accuracy and resolution.	15

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of basics of instrumentations.

Books Recommended:-

1. 'A text book in Electrical Technology', **B. L. Theraja**, *S. Chand and Co*.
2. 'Performance and Design of AC Machines', **M. G. Say**, *ELBS Ed*.
3. 'Digital Circuits and Systems', **K. R. Venugopal and K. Shaila**, *Tata McGraw Hill*.
4. 'Logic circuit design', **Shimon P. Vingron**, *Springer*.
5. 'Digital Electronics', **Subrata Ghosha**, *Cengage Learning*.
6. 'Electronic Devices and Circuits', **S. Salivahanan and N. S. Kumar**, *Tata McGraw Hill*.
7. 'Electronic Circuits: Handbook of Design and Applications', **U. Tietze and Ch. Schenk**, *Springer*.
8. 'Electronic Devices', **Thomas L. Floyd**, 7th Ed., *Pearson India*.

E-Resources:-

1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

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FACULTY OF SCIENCES

DEPARTMENT OF PHYSICS

COURSE: B.Sc. **SEMESTER: VI**

SUBJECT NAME: Physics Practical-VI **SUBJECT CODE: 4SC06PPR1**

Teaching & Evaluation Scheme:-

Teaching hours/week				Credit	Evaluation Scheme/semester							
					Theory				Practical			
Th	Tu	Pr	Total		Sessional Exam		University Exam		Internal		University	Total Marks
					Marks	Hrs	Marks	Hrs	Pr	TW		
0	0	6	6	3	--	--	--	--	15	15	70	100

Objectives:-The general purpose of this course is

- To expose the student knowledge of Practical related to theory.

Prerequisites:-Fundamental knowledge of Physics Practical.

Course outline:-

Sr. No.	Course Contents
1	To study the characteristics of a LDR.
2	Construction of a Michelson's Interferometer or a Fabry-parot Interferometer.
3	Recording and reconstruction of holograms.
4	To measure the numerical aperture of an optical fibre.
5	To observe the loading effect of a multimeter by measuring voltage across a low resistance and high resistance.
6	Measurement of voltage, frequency, time period and phase angle using a CRO.
7	Measurement of rise, fall and delay time using a CRO.
8	Measurement of R, L, and C using a LCR bridge/ Universal bridge.
9	To measure (a) voltage, (b) Frequency of a periodic waveform using a CRO.
10	To study the Lissajous figures.
11	To study the energy band gap of a thermistor.
12	To study UJT as a relaxation oscillator.
13	To determine the wavelength of sodium light using Newton's rings.
14	To study the damped simple harmonic motion.
15	To determine the acceleration due to gravity by Kater's pendulum.
16	Determination of thickness of air film and wavelength of light using spectrometer (Fabry-Parot etalon).

* 15% of new experiments can be introduces AND/OR replaced as per the need, with the permission of the Head.

Learning Outcomes:-After successful completion of this course, students have:

- Knowledge of practical's and its application in various fields.

Books Recommended:-

1. 'B. Sc. Practical Physics', **C. L. Arora**, *S. Chand and Company Ltd*.
2. 'Advanced Practical Physics', **M. S. Chauhan and S. P. Sing**, *Pragati Prakashan*.
3. 'Experimental Physics', **University Granth Nirman Board**, (Gujarati Medium).
4. 'Physics through experiments Vol. I & II', **B. Saraf et al.**, *Vikas Publishing House*.
5. 'Advanced Practical Physics', **S. L. Gupta and V. Kumar**, *Pragati Prakashan*.

6. 'An advanced course in practical Physics', **D. Chattopadhyay and P. C. Rakshit**, *New Central Book Agency Pvt. Ltd.*
7. 'Electronic Laboratory Primer', **Poorna Chandra and Sasikala**, *S. Chand and Company Ltd*.
8. 'Advanced Practical Physics for Students', **B. L. Wosnop and H. T. Flint**, *Asia Publishing House*.
9. 'Advanced Level Physics Practicals', **Michael Nelson and Jon M. Ogborn**, 4th Ed., *Heinemann Educational Publishers*.
10. 'Engineering Practical Physics', **S. Panigrahi and B. Mallick**, *Cengage Learning India Pvt. Ltd*.
11. 'A Text Book of Practical Physics', **Indu Prakash and Ramakrishna**, 11th Ed., *Kitab Mahal*.
12. 'A Laboratory Manual of Physics for Undergraduate Classes', **D. P. Khandelwal**, *Vani Publication*.
13. 'Basic Electronics: A Text Lab Manual, **P. B. Zbar, A. P. Malvino and M. A. Miller**, *McGraw Hill*.

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1. http://pms.iitk.ernet.in/wiki/index.php/Physics
2. www.wikipedia encyclopaedia
3. www.physic.about.com
4. www.physic.org
5. www.Physicsclassroom.com
6. www.howstuffwork.com
7. www.colorado.edu/physics/2000
8. www.ndrs.org. physic.com
9. www.physlinc.com
10. www.fearophysic.com
11. www.hyperphysics.com

Useful CD Rom for e-learning:-

1. Hyper Physics.
2. Encyclopaedia of Science (D. K. Multimedia).
3. Physics Encyclopaedia.
4. Virtual Physics Junior (Original PC CD Rom).
5. Encyclopaedia Britannica-2008.