KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

ERODE – 638 107

B.Sc (Physics)

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2019-2020

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SYLLABUS

Sem.	Course Code	Core Practical – I	Total Marks: 100		Hours Per Week	Credits
II	19UAOCP202		CIA: 40	ESE: 60	3	4

OBJECTIVES

- To train the students to work systematically in the laboratory
- To inculcate the practical exposure and to evaluate theoretical concepts

COURSE OUTCOME:

At the end of the course, Students will be able to

- CO1: Recognize the methods of laboratory techniques
- CO2: Explore the relation between theory and experiment
- CO3: Acquire the basic ideas on the principle of resonance
- CO4: Correlate the principles of diffraction to experimental situations
- CO5: Apply experimental methodology to physical phenomena

(EXAMINATION AT THE END OF SECOND SEMESTER)

Any 12 Experiments Only

1. Compound Bar Pendulum
2. Young's Modulus – Non-uniform bending – Pin & Microscope
3. Young's Modulus – Uniform bending – Optic Lever
4. Young's Modulus – Cantilever – Deflection method
5. Rigidity Modulus – Static Torsion – Scale & Telescope
6. Rigidity Modulus – Torsion Pendulum(With Symmetrical Masses)
7. Sonometer – Frequency of A. C
8. Sonometer – Verification of Laws
9. Spectrometer – Refractive Index of Solid Prism
10. Spectrometer – (i-d) curve

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11. Spectrometer – Dispersive Power of Grating

12. Spectrometer – Narrow Angled Prism

13. Thermal Conductivity of a Bad Conductor – Lee's Disc

14. Specific Heat Capacity by Cooling – Newton's Law of Cooling

15. Viscosity by Capillary flow Method

Demonstration

1. Specific Heat Capacity – Joule's Calorimeter

2. Ultrasonic Interferometer – Compressibility of a liquid

Parameters	**Maximum Marks**
Record Note book	05
Formula Used and Circuit diagram (if applicable)	15
Tabulation	15
Observation	15
Calculation	05
Result	05
Total	**60**

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Sem.	Course Code	ALLIED II: CHEMISTRY- II	Total Marks: 75		Hours Per Week	Credits
II	19UAOAT203		CIA: 20	ESE: 55	4	3

Objectives

- To understand the importance of Coordination Chemistry
- To understanding in chemistry of Aromatic compounds and Industrial applications.

Course Outcome:

At the end of the course the students will be able to

CO1 - Learn the Laboratory principles and methods of metallurgy.
CO2 - Get familiarized with the coordination compounds.
CO3 - Understand the mechanism of aromatic compounds.
CO4 - Know the different processes of thermodynamics.
CO5 - Develop basic knowledge with the electrochemistry and Get a theoretical exposure for safety aspects of chemistry laboratory.

UNIT I

Laboratory principles: Safety and Hygiene in the Chemistry Lab: Storage and Handling of Chemicals - Acids, Ethers, Toxic and Poisonous chemicals. Antidotes and First Aid procedures, Role of Fire extinguishers.

Metallurgy

Terms: Definition of Mineral, Ore, Mining, Flux, Slag and Poling.

General methods of extraction of metals: Ore dressing methods. Reduction methods, Refining methods – Zone refining and Van Arkel Zones refining.

Furnaces: Blast and Reverberatory furnaces.

Extraction of metals: Extraction process of Uranium.

UNIT II

Coordination Chemistry

Terminology: Definition of Complex ion, Central ion, Ligand, Coordination bond, Coordination number, Coordination sphere, Chelate complex, Unidentate and Bidentate Ligands. Nomenclature of Mononuclear complexes.

Isomerism in Coordination compounds: Stereoisomerism and Optical isomerism.

Theories: Werner, Sidge Wick Effective Atomic Number and Pauling"s Valence bond theory.

Chelation - Haemoglobin, Chlorophyll, EDTA – Determination of Hardness of water.

Applications in quantitative and qualitative analysis of Coordination compounds.

UNIT III

Aromatic Compounds: Electrophilic substitution in benzene. Mechanism of Nitration, Halogenation, Alkylation, Acylation and Sulphonation.

Naphthalene - Structural elucidation, Preparation, Properties and Uses.

Preparation, Properties and Uses of Saccharin and Aspartame.

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UNIT IV

Energetics: Thermodynamics - Definition of First law of Thermodynamics. Types of systems - Reversible, Irreversible. Isothermal, Adiabatic and Spontaneous Process.
Enthalpy, Bond energy. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.

UNIT-V

Electrochemistry: Kohlraush''s law and its application. Conductometric titration.
pH determination - Galvanic cells, EMF Standard electrode potentials, Reference electrodes. Electrochemical series and its applications. Principles of Electroplating.
Phase Rule: Definition of terms in Phase rule. Study of a simple Eutectic system: Pb-Ag.

TEXTBOOK

1. B.R. Puri, L.R. Sharma, K.C. Kalia, Principles of Inorganic Chemistry, 28th Edition, Vishal Publication, New Delhi.2004.
2. R.D. Madan Advanced Inorganic Chemistry, 2nd Edition. S. Chand & Company, New Delhi, 2005.
3. D. Van Samuel Glasstone, Thermodynamics- Nostrand company, Inc., 5th Edition, Eastern Wiley Publication, 2002.
4. B.S. Bahl and Arun Bahl, Advanced Organic Chemistry, 1st Edition, S.Chand and Company Ltd, New Delhi, 1998.

REFERENCE BOOKS

1. R.T. Morrision, and R.N. Boyd, Organic chemistry, 6th Edition, Prentice Hall Private Limited, New Delhi, 1997
2. B.R. Puri, L.R. Sharma and Madan S.Pathania, Elements of Physical chemistry, 30th Edition, Vishal publication, Jalandhar-Delhi 2007.
3. B.S. Bahl, G.D. Tuli and Arun Bahl, Essential of Physical chemistry, S.Chand publications, New Delhi, Reprint 2004.
4. Mohan Malhotra, Latest Cottage Industries, 20th Edition, Vishal publishers, Meerut, 1980.
5. Analytical chemistry: R.Gopalan, S.Chand & Co., New Delhi, 2007.

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 3 = 15 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Mathematical Physics	Total Marks: 100		Hours Per Week	Credits
V	17UAOCT501		CIA: 25	ESE: 75	5	4

OBJECTIVES

- To impart mathematical knowledge for the description of Physical Phenomenon
- To develop the problem solving ability

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Correlate the principles of curl and divergence in practical applications
- CO2: Understand the concept of different coordinate systems
- CO3: Gain insight over the requirement of matrices
- CO4: Develop their views in Newtonian mechanics
- CO5: Evaluate the applications of Hamiltonian formalism

UNIT I:

Vector Calculus: Gradient of a Scalar Field – Line, Surface and Volume Integrals – Divergence of a Vector Function – Curl of a Vector Function – Important Vector Identities – Gauss's Divergence theorem – Stoke's theorem

UNIT II:

Application of Gauss's Theorem: Deduction of Gauss's law, Poisson's and Laplace's equations from Gauss's Divergence theorem.

Curvilinear Co-ordinates: Orthogonal Curvilinear Co-ordinates – Differential Operators in terms of Orthogonal Curvilinear Co-ordinates – Spherical Polar Co-ordinates (r, θ, φ) and Differential Operators – Cylindrical Co-ordinates and Differential Operators

UNIT III:

Matrices: Introduction – Special types of Matrices – Transpose of a Matrix – The Conjugate of a Matrix – The Conjugate Transpose of a Matrix – Symmetric and Asymmetric Matrices – Hermitian and Skew Hermitian Matrices – Orthogonal, Unitary Matrices and their Properties (Theorem 2.5 & 2.6) – Eigen Values and Eigen Vectors – Cayley Hamilton Theorem

UNIT IV:

Lagrangian Formulation of Mechanics: Constraints – Generalised co-ordinates – Transformation equations, configuration space - Generalised displacement, Velocity.

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Acceleration, Momentum, Force – Principle of virtual work - D'Alembert's Principle – Lagrange's equations from D'Alembert's Principle – Applications of Lagrange's equations: simple pendulum, Atwood's machine and compound pendulum.

UNIT V:

Lagrangian Formulation of Conservation Theorems: Generalised momentum and cyclic coordinates – Generalised momentum – Energy – Linear momentum – Angular momentum

Hamiltonian Formulation of Mechanics: Phase space – Hamiltonian function – Hamilton's equations – Physical Significance of Hamiltonian function – Applications of Hamilton's equations: Simple Pendulum, compound pendulum and Linear Harmonic Oscillator.

Text Books:

1. Sathya Prakash – Mathematical Physics with Classical Mechanics – Fifth Revised Edition 2006 – Sultan Chand & Sons Educating Publishers, New Delhi.(UNIT I to IV)
2. Gupta, Kumar and Sharma – Classical Mechanics – Twenty sixth Edition 2013 Reprint 2014 - Pragati Prakashan Publications, Meerut. (UNIT V)

Reference Books:

1. Mathematical Physics – Dr. B. S. Rajput – 27th Edition 2014 – Pragati Prakashan Publications
2. Mathematical Physics – H. K. Dass & Dr. Rama Verma – 7th Revised Edition 2014 – S. Chand Publications
3. Mathematical Physics – P. K. Chattopadhyay – 2nd Edition 2013 Reprint 2018 – New Age International Publishers
4. Mathematical Physics – B. D. Gupta — 4th Edition 2010 First Reprint 2016 – Vikas Publishing House Pvt. Ltd.,

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Quantum Mechanics and Relativity	Total Marks: 100		Hours Per Week	Credits
V	17UAOCT502		CIA: 25	ESE: 75	5	4

OBJECTIVES

- To provide an introduction to Quantum Mechanics
- To apply the principles of Quantum concepts to calculate observables on known Wave Functions.

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recollect the basic principles of wave mechanics
- CO2: Understand the validation of Schrodinger's equation
- CO3: Exposed to commutation algebra
- CO4: Analyse the differences between special and general theory of relativity
- CO5: Evaluate the underlying principles of general theory of relativity

UNIT I:

Wave Mechanics: The de-Broglie wavelength – Phase Velocity of de-Broglie waves – Expression for Group Velocity – Group Velocity of de-Broglie waves – Relation between Group Velocity and Phase Velocity – Davisson and Germer's Experiment – G. P. Thomson's Experiment – Heisenberg's Uncertainty Principle.

UNIT II:

Schrodinger's Wave Equation: Basic Postulates of Wave Mechanics – Derivation of Time-dependent form of Schrodinger equation – Schrodinger's equation: Steady-state form – Physical Significance of Ψ – Orthogonal and Normalized wave functions – Eigen Functions and Eigen Values – Probability Current Density.

Applications of Schrodinger's Equation: Particle in a one dimensional box – Potential step – The Barrier Penetration problem – Linear Harmonic Oscillator.

UNIT III:

Commutation Algebra: Commutation relation between Position and Momentum, H and p, components of L and L – Ladder Operator L_+ and L_- - Commutation relation of orbital angular momentum with position – Hermitian operator – Properties of Hermitian operators.

Total Angular Momentum: Commutation relation between Square of the Total Angular Momentum and its Components – Commutation rule for the Components of Generalised Angular Momentum Operator – Ladder Operators J_+ & J_- - Eigen Values of J^2 and J_z

UNIT IV:

Special Theory of Relativity: Frame of Reference – Newtonian Relativity – Galilean Transformation equations – The Ether Hypothesis – The Michelson-Morley Experiment and explanation of the negative result – Postulates of Special Theory of Relativity – The Lorentz Transformation equations – Length Contraction – Time Dilation.

UNIT V:

General Theory of Relativity: Variation of Mass with Velocity - Mass Energy Equivalence - Minkowski's Four Dimensional Space-Time Continuum – Postulates of General theory of Relativity.

The Photon: Photons and Gravity - Gravitational Red Shift - Black Hole.

Text Book:

R. Murugesan & Er. Kiruthiga Sivaprasath – Modern Physics – Revised Edition 2015 – S. Chand Publications, New Delhi.

Reference Books:

1. Advanced Quantum Mechanics – Sathyaprakash – Fifth Revised and Enlarged Edition – Reprint 2014 – Kedar Nath, Ram Nath Publications, Meerut.
2. Elements of Quantum Mechanics – Kamal Singh, S.P.Singh – First Edition 2005 – Reprint 2013 – S. Chand Publications, New Delhi.
3. Quantum Mechanics – Leonard I. Schiff – Third Revised Edition 2010 – Tata Mc Graw Hill Publishing Pvt. Ltd.
4. A Text book of Quantum Mechanics – P.M. Mathews & K. Venkatesan – Second Revised Edition 2010 – Mc Graw Hill Publishing Pvt. Ltd

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Atomic Physics and Spectroscopy	Total Marks: 100		Hours Per Week	Credits
V	17UAOCT503		CIA: 25	ESE: 75	4	4

OBJECTIVES

- To impart the knowledge in the Structure of Atom and Atom Models
- To understand the concept of Quantum Numbers

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recognize cathode rays, positive rays and atomic models
- CO2: Infer the basic ideas of quantum numbers and spatial quantization
- CO3: Implement the application of X-rays in determining the crystal structures
- CO4: Comprehend various photoelectric cells
- CO5: Evaluate the influence of electric and magnetic field in spectral line splitting

UNIT I:

Cathode Rays: Properties - Charge of Electron by Millikan's Oil Drop method – Dunnington's method for determining e/m.

Positive Rays: Discovery – Properties – Thomson's Parabola method – Bainbridge's Mass Spectrograph.

Structure of the Atom: Bohr Atom Model – Effect of Nuclear motion on Atomic Spectra – Evidences in favour of Bohr's Theory - Critical Potentials – Atomic Excitation – Franck and Hertz's method – Davis and Goucher's method – Sommerfeld's Relativistic Atom Model

UNIT II:

Vector Atom Model: Introduction – Spatial Quantisation and Spinning Electron - Quantum Numbers associated with the Vector Atom Model – Coupling Schemes – The Pauli Exclusion Principle – Magnetic Dipole Moment due to Orbital Motion of the Electron – Magnetic Dipole Moment due to Spin – Stern and Gerlach Experiment

UNIT III:

X-rays: Production of X-rays – Properties of X-rays – Continuous and Characteristic X-ray Spectra – Origin of X-rays and Moseley's law – Absorption of X-rays - Bragg's law – Bragg X-ray Spectrometer – Determination of Crystal Structure by Powder Crystal method, Laue method and Rotating Crystal method – Compton Scattering.

UNIT IV:

Photoelectric Effect: Introduction – Richardson and Compton Experiment – Laws of Photoelectric Emission – Einstein's Photoelectric Equation – Experimental Verification by Millikan's Experiment – Photoelectric Cells: Photo-emissive cell – Photo-voltaic cell – Photoconductive cell – Applications of Photoelectric cells.

UNIT V:

Molecular Spectroscopy: Raman effect – Experimental study of Raman effect – Quantum theory of Raman effect - Applications of Raman effect –Zeeman effect – Normal Zeeman effect – Lorentz theory of normal Zeeman effect – Anomalous Zeeman effect –Paschen-Back effect – Stark effect.

Text Books:

1. J. B. Rajam – Atomic Physics – Edition 2004 Reprint 2007 - Sultan Chand Publications, New Delhi. (UNIT I: Chapter 1)
2. R. Murugesan & Er. Kiruthiga Sivaprasath – Modern Physics – Revised Edition 2015 – S. Chand Publications, New Delhi. (UNIT I to V)

Reference Books:

1. Fundamentals of Modern Physics – Agarwal & Agarwal – 7th Revised Edition 2013 - Pragati Prakashan Publications, Meerut.
2. Atomic and Nuclear Physics – N. Subramaniam and Brijlal – Edition 2007 - Sultan Chand Publications, New Delhi.
3. Modern Physics – G. Aruldhas and P. Rajagopal – Revised Edition 2005 - Prentice-Hall of India
4. Fundamentals of Molecular Spectroscopy – Colin N. Banwell and Elaine M. McCash – 4th Edition 2016 – Mc Graw Hill Education Publishers

QUESTION PAPER PATTERN		
SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Basic Electronics	Total Marks: 100		Hours Per Week	Credits
V	17UAOCT504		CIA: 25	ESE: 75	4	3

OBJECTIVES

- To impart the basic ideas of Electronics
- To inculcate the knowledge to develop the small circuits
- To motivate the students to apply the knowledge of electronics in their day-to-day life

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Reminisce the concepts of diodes
- CO2: Expand the principles of diodes to transistors
- CO3: Relate the applications of active components in amplifiers and oscillators
- CO4: Analyse the usage of passive components in clippers and clampers
- CO5: Estimate the application of op-amp in mathematical operations

UNIT I:

Semiconductors and Diodes: Semiconductor - Bonds in Semiconductors – Energy Band Description of Semiconductors – Effect of Temperature on Semiconductors – Intrinsic Semiconductor – Extrinsic Semiconductor: n-type and p-type – pn junction – Properties of pn junction – Biasing a pn junction – Volt-Ampere Characteristics of pn Junction – Zener Diode – Equivalent circuit of a Zener Diode – Zener Diode as Voltage Stabiliser.

UNIT II:

Transistors: Introduction – Transistor Action – Transistor Circuit as an Amplifier -Expression for collector current in common base and common emitter connections – Relation between α and β – Characteristics of CE connection – JFET : Principle and Working – Difference between JFET and BJT – Output Characteristics of JFET – Parameters of JFET – UJT : Construction and operation - Characteristics of UJT – UJT relaxation oscillator.

UNIT III:

Amplifiers: Classification of Amplifiers: RC Coupled Transistor Amplifier - Transformer-Coupled Amplifier – Direct-Coupled Amplifier– Power Amplifiers: Difference between Voltage and Power Amplifiers – Class A and Class B power Amplifiers.

Sinusoidal Oscillator: Oscillatory Circuit – Positive Feedback - Barkhausen Criterion – Colpitt's Oscillator - Hartley Oscillator - Phase Shift Oscillator.

UNIT IV:

Solid-State Switching Circuits: Multivibrators – Types of Multivibrators – Transistor Astable Multivibrator – Transistor Monostable Multivibrator – Transistor Bistable Multivibrator - Differentiating and Integrating Circuits - Clipping and Clamping Circuits.

UNIT V:

Operational Amplifiers: Introduction - Circuit Symbol – Characteristics – CMRR – Slew Rate – Inverting Amplifier — Adder – Subtractor – Scaler - Integrator – Differentiator – Logarithmic Amplifier – Comparator - Non-inverting Amplifier - Voltage Follower.

Text Books:

1. V. K. Mehta & Rohit Mehta - Principles of Electronics - Revised Edition 2015 – S. Chand Publications, New Delhi. (UNIT I to IV)
2. R. Murugesan & Er. Kiruthiga Sivaprasath – Modern Physics – Eighteenth Edition 2016 – S Chand Publications, New Delhi. (UNIT – V)

Reference Books:

1. A Text Book of Applied Electronics - R. S. Sedha – Revised Edition 2015 - S. Chand Publications, New Delhi.
2. Basics Electronics (Solid State) – B. L. Theraja – 5th Edition 2014 - S. Chand Publications, New Delhi.
3. Hand Book of Electronics – Gupta & Kumar – 14th Edition 2014 - Pragati Prakashan Publications, Meerut.
4. Principles of Electronics (Volume I & II) – B. V. Narayana Rao – Edition 1994 - Wiley Eastern Ltd., & New Age International Ltd., New York.

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Solid State Physics	Total Marks: 100		Hours Per Week	Credits
VI	17UAOCT601		CIA: 25	ESE: 75	5	4

OBJECTIVES

- To gain the knowledge of Crystallography which is required to understand Mechanical, Optical and Electrical Properties of Solids
- To acquaint with the up-to-date status of phenomena in Solids and to offer a broadening knowledge in Solid State Electronics

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Evoke the basics of crystal systems
- CO2: Understand the types of defects in crystals
- CO3: Apply the knowledge of magnetic properties in different theories of magnetism
- CO4: Expand the views in the phenomenon of superconductivity
- CO5: Evaluate the principles of optoelectronic devices

UNIT I:

Crystal Structure: Introduction - Lattice points and space lattice – Basis and crystal structure – Unit cells and lattice parameters – Crystal systems – Metallic crystal structures: SC, BCC, FCC, Diamond and NaCl Structure.

Imperfections in Crystals: Point Defects: Vacancies – Interstitialcies – Impurities – Electronic Defects - Line Defects: Edge Dislocation and Screw Dislocation - Surface Defects: External Surface Imperfections – Internal Surface Imperfections.

UNIT II:

Superconductivity: Introduction – Properties – Meissner Effect – Classification of Superconductors – BCS theory of superconductivity – Josephson Effect – Theory of DC & AC Josephson Effect – London Equation – High T_c Superconductors – Applications.

UNIT III:

Magnetic Properties of Materials: Introduction – Langevin's theory of Diamagnetism and Para magnetism – Quantum theory of Paramagnetism – Cooling by Adiabatic Demagnetisation of a

Paramagnetic Salt – Ferromagnetism – Domain theory of Ferro magnetism – Soft and Hard magnetic materials - Weiss theory of Ferromagnetism

UNIT IV:

Dielectrics: Introduction – Different types of electric polarisation – Lorentz method for finding the internal field for a cubic structure - Clausius –Mosotti relation – Dielectric Loss – Determination of dielectric constant of a dielectric material – Dielectric breakdown – Properties and applications of different types of insulating materials

UNIT V:

Optoelectronic Devices: Light Emitting Diode (LED) – Photoconductors - Photo Diode – Photo Transistor - Liquid Crystal Display (LCD) - Solar Cell

Text Books:

1. S. O. Pillai – Solid State Physics – Eighth Edition 2018 - New Age International Publishers (UNIT I: Chapter 4)
2. R. Murugesan & Er. Kiruthiga Sivaprasath – Modern Physics – Eighteenth Edition 2016 – S Chand Publications, New Delhi. (UNIT II to V)

Reference Books:

1. Solid State Physics - Gupta. Kumar – 9th Revised Edition 2016 – K. Nath & Co., Meerut
2. Introduction to Solid State Physics - Charles Kittel - 8th Edition 2004 Reprint 2013 – Wiley India Pvt. Ltd.
3. Elements of Solid State Physics - J.P. Srivastava – 2nd Edition 2006 – Prentice-Hall of India.

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Nuclear Physics	Total Marks: 100		Hours Per Week	Credits
VI	17UAOCT602		CIA: 25	ESE: 75	5	4

OBJECTIVES

- To impart basic concepts of Nuclear Physics with emphasis on Nuclear Structure and Interactions of Radiation with Matter.
- To introduce the fundamental principles that highlight Detectors, Accelerators, Fission and Fusion.

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recall the basics of nuclei and study the models of nuclear structure
- CO2: Understand the mechanism of accelerators
- CO3: Aware the meaning of radioactivity and understand its origin
- CO4: Expand the views in discriminating fission and fusion
- CO5: Assess the origin of elementary particles

UNIT I:

Introduction to Nucleus: Introduction – Classification of Nuclei – General Properties of Nucleus – Binding Energy – Nuclear Stability – Nuclear Forces – Meson theory of Nuclear Forces.

Models of Nuclear Structure: The Liquid Drop Model - The Shell Model – The Collective Model.

UNIT II:

Detectors and Particle Accelerators: Introduction - Ionization Chamber – Solid State Detectors – Proportional Counter – Geiger-Muller Counter – The Wilson Cloud Chamber – Bubble Chamber –Scintillation Counter – The Linear Accelerator – The Cyclotron – The Betatron.

UNIT III:

Radioactivity: Laws of Radioactivity – Properties of Alpha, Beta and Gamma rays – Experimental measurement of the range of Alpha particles - Theory of Alpha Decay – Neutrino theory of Beta Decay – Detection of Neutrino -- K-electron capture - Origin of Gamma Rays.

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UNIT IV:

Nuclear Fission and Fusion: Nuclear Fission – Energy released in Fission – Bohr and Wheeler's theory of Nuclear Fission – Chain Reaction – Critical Size – Natural Uranium and Chain Reaction – Atom Bomb - Nuclear Reactors – Nuclear Fusion – Source of Stellar Energy – Carbon-Nitrogen Cycle – Proton-Proton Cycle – Hydrogen Bomb - Controlled Thermonuclear Reactions.

UNIT V:

Elementary Particles: Introduction - Baryons – Hyperons – Leptons – Mesons – Particles and Anti-particles: Electron and Positron, Proton and Antiproton, Neutron and Antineutron, Neutrino and Antineutrino – Antimatter – The fundamental Interactions – Elementary Particle Quantum Numbers – Conservation laws and Symmetry – The Quark Model.

Text Book:

R. Murugesan & Er. Kiruthiga Sivaprasath – Modern Physics – Eighteenth Edition 2016 – S Chand Publications, New Delhi.

Reference Books:

1. Elements of Nuclear Physics – M. L. Pandya, RPS Yadav – 4th Edition 2011 - Kedar Nath Ram Nath Publications, New Delhi.
2. Nuclear Physics – D. C. Tayal – 2nd Edition 2011 - Himalaya Publishing House, New Delhi.
3. Nuclear Physics – Dr. S. N. Ghoshal – Revised Edition 2014 – S Chand & Co Ltd., New Delhi
4. Modern Physics – G. Aruldhas and P. Rajagopal – Edition 2005 Reprint 2014 – PHI Learning Private Ltd.,

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Fundamentals of Digital Electronics	Total Marks: 100		Hours Per Week	Credits
VI	17UAOCT603		CIA: 25	ESE: 75	4	3

OBJECTIVES

- To introduce Number Systems and Codes
- To study the correlation between Boolean expressions

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recollect number systems and binary codes
- CO2: Implement logic gates in arithmetic circuits
- CO3: Resolve the usage of flip-flops as counters and registers
- CO4: Investigate flip-flops in converters
- CO5: Explore semiconductor memories

UNIT I:

Number Systems: Decimal numbers – Binary numbers – Decimal to Binary conversion – Binary Arithmetic – 1's and 2's Complements of Binary Numbers – Hexadecimal Numbers – Octal Numbers - Binary Coded Decimal (BCD) – Gray Code.

Logic Gates: Inverter – AND Gate - OR Gate – NAND Gate - NOR Gate – Exclusive OR and Exclusive NOR Gates - Boolean Operations and Expressions – Laws and Rules of Boolean Algebra - DeMorgan's Theorems.

UNIT II:

Arithmetic Circuits: Half Adder – Full Adder – Half Subtractor – Full Subtractor – Parallel Binary Adder and Subtractor (2's Complement)

Flip-Flops: R-S Flip-Flops – Clocked R-S Flip-Flop – D Flip-Flop – Edge-Triggered J-K Flip-Flop – Master-Slave J-K Flip-Flop.

UNIT III:

Shift Registers: Shift-Left Register - Shift-Right Register.

Counters: Asynchronous Counter – Mod-10 Counter – Mod-5 Counter – Four-bit Synchronous Counter with Serial Carry – Four-bit Synchronous Counter with Parallel Carry - Synchronous up/down counter.

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UNIT IV:

Converters: D/A converter – Resistor Divider D/A converter – Binary Ladder Network D/A converter – A/D converter – Voltage to Time A/D converter – Dual slope integrator A/D converter – Counter type A/D converter - Voltage to Frequency A/D converter - Successive Approximation A/D converter.

UNIT V:

Semiconductor Memories: Memory unit – Concept of memory using registers – Read only memories: ROM, PROM, EPROM and EEPROM – RAM: Bipolar RAM, MOS RAM cells, Static MOS RAM cell and Dynamic MOS RAM

Text Books:

1. Digital Fundamentals – Thomas L. Floyd - Tenth Edition 2017 - Prentice Hall of India (UNIT I: Chapter 2, 3 & 4)
2. V. K. Puri – Digital Electronics – Tata Mc Graw-Hill Publishing Company Limited – 26th Reprint 2016. (UNIT II – V)

Reference Books:

1. Digital Principles and Applications - D. P. Leach and A. P. Malvino – Sixth Revised Edition 2006 - Tata McGraw - Hill, New Delhi
2. Digital Design – Morris Mano – Revised Edition 2002 - Prentice Hall of India

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	CORE PRACTICAL – III	Total Marks: 100		Hours Per Week	Credits
VI	17UAOCP604	General Practical	CIA: 40	ESE: 60	3	4

OBJECTIVES:

- To train the students on measurements and Instruments
- To strengthen the understanding of theoretical knowledge

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recognize the principles of diffraction in experimental situations
- CO2: Explore the relation between theory and experiment
- CO3: Apply the knowledge of mechanics in real time applications
- CO4: Analyse the impact of Bandgap in conducting process
- CO5: Estimate the principle involved in determining the wavelength of laser source

(EXAMINATION AT THE END OF SIXTH SEMESTER)

Any 12 Experiments Only

1. Spectrometer – Cauchy's Constant
2. Spectrometer – (i – i') Curve
3. Impedance and Power Factor of an Inductive Resistive Circuit
4. Study of Series Resonance Circuit
5. Study of Parallel Resonance Circuit
6. Potentiometer – Reduction Factor
7. Potentiometer – EMF of Thermocouple
8. Potentiometer – Comparison of EMF
9. Potentiometer – High Range Voltmeter
10. Field along the axis of a coil – Vibration Magnetometer
11. Ballistic Galvanometer – Comparison of Mutual Inductance
12. Ballistic Galvanometer – High Resistance by Charging
13. Young's Modulus – Koenig's Method - Uniform bending
14. Young's Modulus – Koenig's Method - Non-uniform bending

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15. Semiconductor Diode - Bandgap Determination

16. Study of Solar cell

Parameters	Maximum Marks
Record Note book	05
Formula Used and Circuit diagram (if applicable)	15
Tabulation	15
Observation	15
Calculation	05
Result	05
Total	**60**

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Sem.	Course Code	CORE PRACTICAL – IV	Total Marks: 100		Hours Per Week	Credits
VI	17UAOCP605	Electronics Practical	CIA: 40	ESE: 60	2	3

OBJECTIVES:

- To train the students on measurements and Instruments
- To strengthen the understanding of theoretical knowledge

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recollect the principles of semiconductors and evaluate its validation in practicals
- CO2: Understand the applications of logic gates in logic circuits
- CO3: Implicate the ideas of theory in constructing the circuits
- CO4: Investigate the basic programming of 8085 microprocessor
- CO5: Review the instruments in wide variety of applications

(EXAMINATION AT THE END OF SIXTH SEMESTER)

Any 12 Experiments Only

1. Characteristics of Junction Diode
2. Characteristics of Zener Diode
3. Characteristics of a Transistor – CE configuration
4. Characteristics of UJT
5. Regulated Power Supply using IC
6. Single Stage RC coupled amplifier
7. Verification of Logic gates using IC
8. NAND gate as Universal building block
9. NOR gate as Universal building block
10. Verification of De Morgan's Theorem using IC
11. Half Adder and Half Subtractor using IC

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12. Op-amp as Inverting and Non-inverting amplifier
13. Op-amp as Adder and Subtractor
14. Astable multivibrator
15. Bistable multivibrator
16. Microprocessor – 8085 – Addition, Subtraction
17. Microprocessor – 8085 – 1's and 2's Complement Subtraction

Parameters	Maximum Marks
Record Note book	05
Formula Used and Circuit diagram (if applicable)	15
Tabulation	15
Observation	15
Calculation	05
Result	05
Total	**60**

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Sem.	Course Code	ELECTIVE COURSE III (A)	Total Marks: 100		Hours Per Week	Credits
VI	17UAOET609	Python for Physics	CIA: 25	ESE: 75	4	4

OBJECTIVES

- To impart the contemporary programming knowledge
- To be able to represent the physics concepts in program

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Installation and running simple python calculators can be done
- CO2: Represents the structure of list and loops
- CO3: Working with functions and dictionaries are applied
- CO4: Comprehends the concepts of modules and files
- CO5: Knowledge of working with NumPy and SciPy are created

UNIT I:

Installing and Running Python - Discovering Operating System - Setting Up Python on Windows

Putting Numbers to Work in Python: Storing Information with Variables - Doing Math in Python - Comparing Numbers - Applying Python Math in the Real World

Logic in Programming: Using a Basic if Statement - Creating Blocks - Adding an else to an if - Testing Many Things with elif - True and False Variables -Using try/except to Avoid Errors - Applying Logic to Real-World Problems

Storing Text in Strings: Creating Strings - Printing Strings - Getting Information about a String - Math and Comparison -Formatting Strings -Using Strings in the Real World

UNIT II:

Processing Input and Output: Getting Information from the Command Line - Getting a Password - Cleaning Up User Input - Formatting Output - Managing Input and Output in the Real World

Grouping Items in Lists: Creating a List - Getting Information About a List -Manipulating Lists - Using Math in Lists -Ordering Lists -Comparing Lists -Using Lists in the Real World

Using Loops to Repeat Code: Repeating a Set Number of Times - Repeating Only When True - Using Loops in the Real World

UNIT III:

Using Functions to Create Reusable Code: Creating a Basic Function - Passing Values to Functions - Variables in Functions: Scope - Grouping Functions within a Function - Sending a Varying Number of Parameters - Using Functions in the Real World

Using Dictionaries to Pair Keys with Values: Creating a Dictionary -Getting Information About a dictionary - Comparing Dictionaries - Using Dictionaries in the Real World

UNIT IV:

Using Python's Modules to Add Functionality: Python Packages - Using the random Module - Using the date time Module - Finding More Modules - Using Modules in the Real World

Working with Program Files: Reading to and Writing from Files - Creating Files - Getting Information about a Directory -Getting Information about a File -Using Files in the Real World

UNIT V:

NumPy and SciPy: Introduction

NumPy: NumPy Arrays – Boolean Statements and NumPy arrays – Read and Write – Math

SciPy: Optimization and Minimization – Inbterpolation – Integration – Statistics – Spatial and Clustering Analysis – Signal and Image Processing – Sparse Matrices – Reading and Writing files beyond NumPy

Text Books:

1. Sams Teach Yourself Python in 24 Hours, Katie Cunningham, SAMS, 2nd Edition, 2014 (UNIT I - IV)
2. SciPy and NumPy, Eli Bressert, O'Reilly, 2013 (UNIT V)

Reference books:

1. Introducing Python – Modern Computing in Simple Packages, Bill Lubanovic, O'Reilly Media Inc, SPD Pvt. Ltd, 2015
2. A Primer on Scientific Programming with Python, Hans Petter Langtangen, Springer, 2014
3. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr, 2015

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	**5 x 7 = 35 Marks** (Either or choice) Two questions from each unit	**3 x 10 = 30 Marks** (Answer any three Questions) One Question from each unit

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Sem.	Course Code	Skill Based Course - Office Automation & Python Programming for Physics	Total Marks: 75		Hours Per Week	Credits
VI	17UAOSP612		CIA: 30	ESE: 45	3	3

OBJECTIVES

- To develop the technical skills in Word and Excel
- To impart Python programming knowledge for Physics problems

COURSE OUTCOMES:

At the end of the course, Students will be able to

- CO1: Recall the theory in document preparation
- CO2: Gain the practical knowledge in excel
- CO3: Develop basic programming skill in Python
- CO4: Analyse the programming structure of Python language
- CO5: Evaluate Physics concepts by executing Python programs

(EXAMINATION AT THE END OF SIXTH SEMESTER)

Office Automation

1. Text Manipulation – Prepare a Letter
2. Prepare a document in newspaper format
3. Prepare a document with bullets, footer & headers
4. Create a Mark Sheet using Table and find out the total marks
5. Create a slide show presentation for a seminar (Any Topic)
6. Create a slide preparation for an Invitation

Python Programming

Write a Python Program for the following:

1. Conversion of Fahrenheit to Celsius and Celsius to Fahrenheit
2. Acceleration due to gravity by compound pendulum
3. Rigidity modulus of the given material by static torsion method
4. Refractive index of the given prism
5. Plotting frequency response graph – LCR series and parallel resonant circuits
6. Generating truth tables for basic logic gates

Parameters	Maximum Marks
Record Note book	05
Experimental Setup / Program	15
Execution	20
Result	05
Total	45

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ACTIVITIES

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

NANJANAPURAM, ERODE - 638 107

DEPARTMENT OF PHYSICS

Guest lecture on "International year of Periodic Table" - 19.08.2019

A Guest Lecture was organized under DBT Star College Scheme in view of celebration of International year of Periodic Table with the Resource person Dr. N. Chandra Sekara, Retired Professor, CBM College, Coimbatore and Dr. A. Chandramohan, Head, Department of Chemistry, Ramakrishna College of Arts and Science College, Coimbatore. During the Guest lecture, Resource persons addressed three broad categories of elements are metals, nonmetals, and metalloids. Further, Students were made to understand how the Periodic Table designed, calculation of atomic number, etc. 150 students from I UG Physics, Biochemistry and Biotechnology were benefited through this Guest Lecture.

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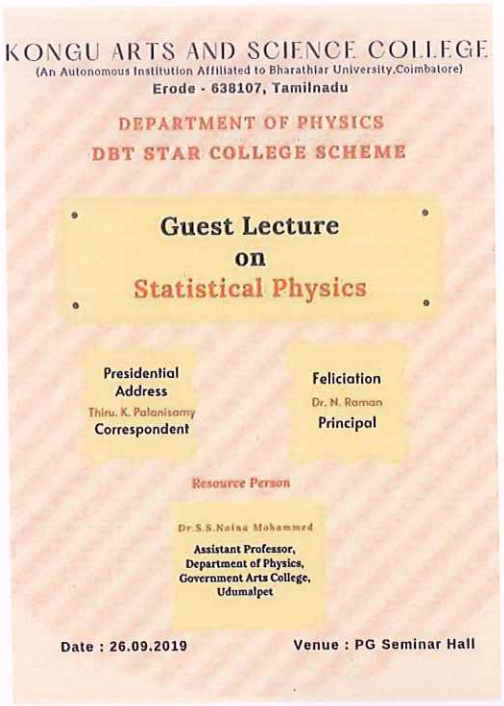
DEPARTMENT OF PHYSICS

Guest lecture on "Statistical Physics" - 26.09.2019



A Guest Lecture Programme was organized on "Statistical Physics" by Dr.S.S.Naina Mohammed, Assistant Professor, Department of Physics, Government Arts College, Udumalpet on 26.09.2019 under DBT fund. All our department students attended the lecture and they were exposed to probability theory, statistics, and mathematical approach of dealing statistical problems. 150 students of our department benefited through this Guest Lecture.

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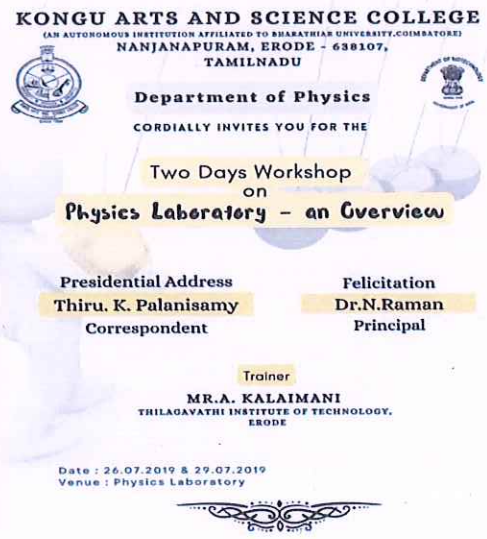
DEPARTMENT OF PHYSICS

Two days Hands on Skill Development Training on 'Physics Laboratory – an Overview' - 26.07.2019 & 29.07.2019

Two days Hands on Skill Development Training on "Physics Laboratory – an Overview" was organized by the Department of Physics. During the training, Trainer M/s Thilagavathy Electronics, Erode trained the students on the principles of basic lab equipments. Students were taught about basic components and circuits in electronics. Also, the students were made to understand the safe handling of Physics laboratory instruments. Further, the replacement of fuse, resistors, ICs, capacitors and other basic components was also taught. 47 First Year UG students attended the workshop and learnt basic laboratory instrument handling techniques.



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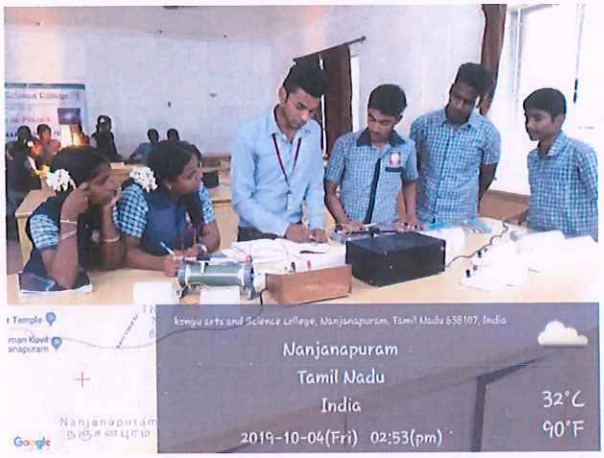
DEPARTMENT OF PHYSICS

Extension Activity - 04.10.2019

An Extension Activity was organized on "HSC level Practicals for XI and XII students" for Government Higher Secondary School, Thindal on 04.10.2019 under DBT fund. Students from our department taught HSC level practicals to the Government school students during the session which helps them to appear for public practical examinations. 40 students of XI and XII standard has benefited through this activity.



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DEPARTMENT OF PHYSICS

A state level interdisciplinary seminar on "Mathematical Physics and Quantum Matters" - 24.02.2020

A state level interdisciplinary seminar jointly organized by Physics and Mathematics departments on 24.02.2020 in the title "Mathematical Physics and Quantum Matters" under DBT Star College Scheme. Resource persons are Dr. L. Senthilkumar, Professor, Bharathiar University, Coimbatore, Dr. Srinivasa Rao Manam, Professor, IIT, Chennai and Dr. R.Sivaraj, Senior Asst. Professor, School of Advanced Sciences, VIT, Vellore. Faculty Members, Research Scholars, students from various Institutes and students of KASC (279) acquired knowledge on Density Functional Theory and Mathematical concepts.

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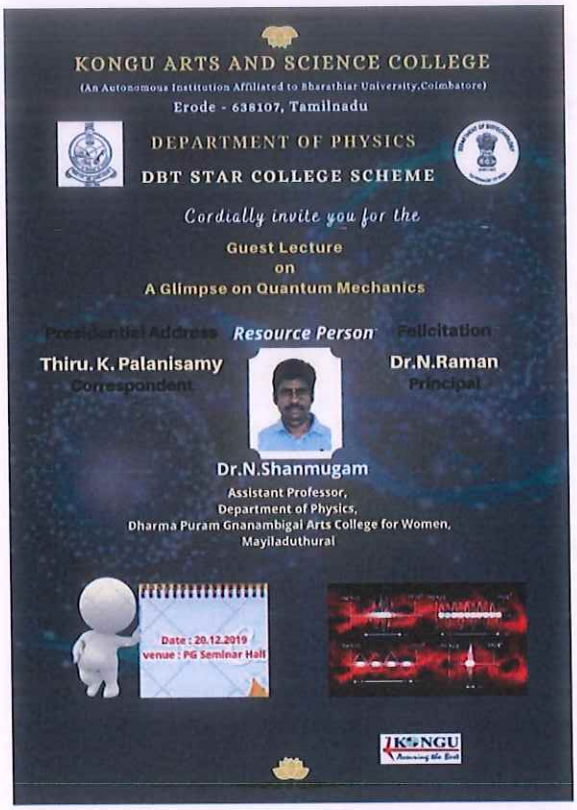
DEPARTMENT OF PHYSICS

Guest lecture on "A Glimpse on Quantum Mechanics" - 20.12.2019



DBT sponsored Guest Lecture on "A Glimpse on Quantum Mechanics" was organized to the students of Physics department on 20.12.2019. Dr.N.Shanmugam, Assistant Professor, Department of Physics, Dharma Puram Gnanambigai Arts College for Women, Mayiladuthurai was the Resource person. Students were encouraged to learn Quantum relativity in an easy way. Students were motivated and get awareness on current trends in the concerned field. Further, Resource person motivated the students for higher studies.

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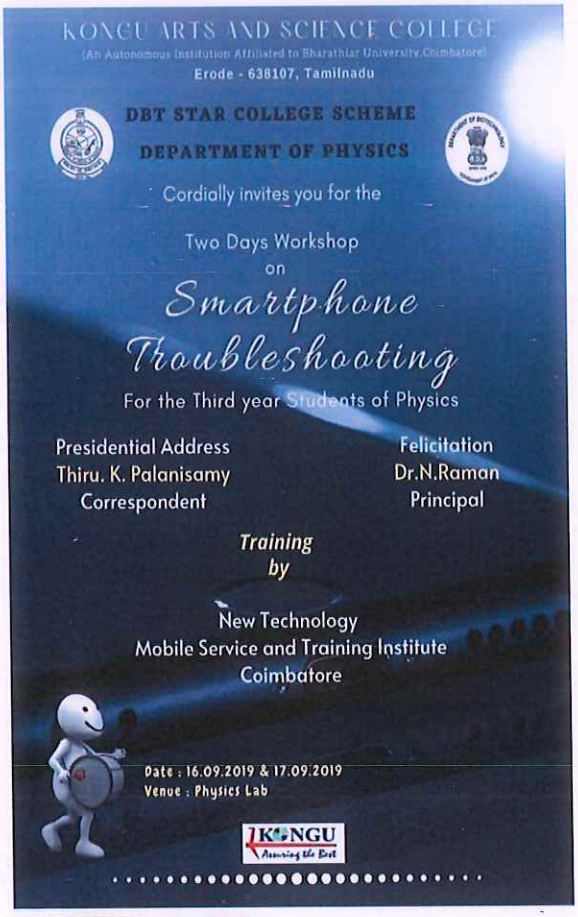
DEPARTMENT OF PHYSICS

Workshop on "Smartphone Troubleshooting" - 16.09.2019 & 17.09.2019

DBT sponsored Workshop on "Smartphone Troubleshooting" was organized to the students of III B. Sc Physics, Mathematics and Computer Science students (82) as an interdisciplinary programme on 16.09.2019 & 17.09.2019. Workshop was conducted by the department of Physics in association with New Technology, Coimbatore. The workshop provided exposure to identify the difference between basic and smart phone features. Students were able to identify the components, assess the faulty components. Students were taught on dismantling and reassembling the basic and smart phones.



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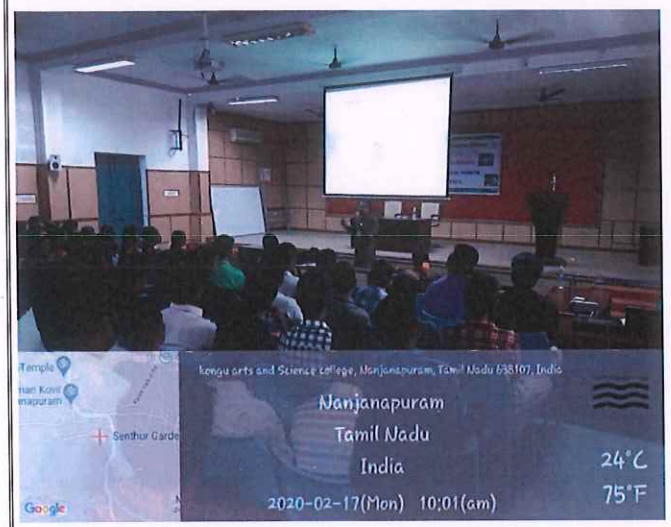
DEPARTMENT OF PHYSICS

Guest lecture on "Societal Applications of Radiation & Radioactivity" - 17.02.2020

DBT sponsored Guest Lecture on "Societal Applications of Radiation & Radioactivity" was organized to the students of Physics department on 17.02.2020. Mr.R.Mathiyarasu, SO/G Head, Radiological and Biological Dosimetry Section (RBDS), Radiological and Environmental Safety Division, Indira Gandhi Centre for Atomic Research, Kalpakkam was the Resource person. Students were encouraged to learn Radiation dosimetric biomarkers in applications beyond radiation protection area and actively introduced clinical practice. Students were motivated and get awareness on current trends in Radiological and Environmental field safety. Further, Resource person motivated the students to take efforts on clearing exams for securing career in esteemed institutes and research centers like IGCAR, BARC, CAT, CECRI, etc.,



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DEPARTMENT OF PHYSICS

Workshop on "Advanced Experimental Physics" - 12.07.2019

Our III B. Sc., Physics students attended a workshop in "Advanced Experimental Physics" on 12.07.2019. Students were taught about the advanced instruments like FT-IR spectrometer, Centrifuge, Photo reactor unit, vacuum coating unit etc., during their laboratory visit to Sri Ramakrishna Mission Vidyalaya College of Arts and Science, Coimbatore. 54 Third Year UG students attended the workshop and gained inspiration to execute their project.

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