BASIC SCIENCES

DEPARTMENT OF DEPARTMENT OF MATHEMATICS:

The Department of Mathematics was established in 2001 and has since been committed to delivering quality education in Mathematics for engineering students. Our faculty members possess expertise in diverse areas such as Fluid Dynamics, Graph Theory, Differential Geometry, Data Analysis, and related fields. The department's primary focus is to nurture and develop mathematical thinking and problem-solving skills among students.

We offer core Mathematics courses for both undergraduate and postgraduate programs, along with a range of elective courses. Our faculty have published numerous papers in national and international journals and have also authored textbooks in Engineering Mathematics. Additionally, the department organizes an International Conference annually, fostering academic exchange and collaboration.

VISION OF THE DEPARTMENT

Our faculty members possess expertise in diverse areas such as Fluid Dynamics, Graph Theory, Differential Geometry, Data Analysis, and related fields.

MISSION OF THE DEPARTMENT

- **M_1:** To provide the foundation and application in the area of Differential, integral and Vector Calculus, Linear and Partial differential Equations, Linear algebra, transformations applied mathematics.
- **M_2:** To provide the tools for iterative problem solving.
- **M_3:** To provide statistical and probabilistic tools for computation.

SHORT TERM GOALS

- To create a sense of acceptance towards mathematics among graduate students.
- To achieve consistently increasing trend in the pass percentage.
- To enhance the magnitude of consultancy services.
- To increase the quality and quantity of publications.
- To apply for funded projects sponsored by DST/VGST/AICTE.

LONG TERM GOALS

- To have an All-Doctorate team of faculty members.
- To organize Faculty Development Programmes periodically.
- To conduct Short Term Courses in Mathematics.
- To collaborate with industries and enter into MOUs with them.
- To establish a Centre of Numerical Computations.

DEPARTMENT RESOURCES

- Well-ventilated class and tutorial rooms equipped with multimedia projectors
- Departmental library
- Internet Facility

COURSE CURRICULUM (2022 SCHEME)

Semester I	
BMATS101/ BMATE101	Calculus, Series Expansion and Multivariable Calculus, Ordinary Differential Equations (ODEs) of First Order, Modular Arithmetic, Linear Algebra

Semester II	
BMATS201/ BMATE201	Integral Calculus, Vector Calculus, Vector Space and Linear Transformations, Numerical Methods -1, Numerical Methods -2, Laplace Transform

Semester III	
BCS301 / BMATEC301	Probability Distributions, Joint probability distribution & Markov Chain, Statistical Inference 1&2, Module-5: Design of Experiments & ANOVA. Fourier series and practical harmonic analysis, Infinite Fourier Transforms, Z Transforms, Ordinary Differential Equations of Higher Order, Curve fitting, Correlation, and Regressions

Semester IV	
BCS405A	Fundamentals of Logic, Properties of the Integers, Relations and Functions, The Principle of Inclusion and Exclusion, Introduction to Groups Theory

COURSE OUTCOMES (CO'S)

Semester I				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**

1	Mathematics-I for computer science and engineering stream	BMATS101	CO1	apply the knowledge of calculus to solve problems related to polar curves andlearn the notion of partial differentiation to compute rate of change of multivariate functions
			CO2	analyze the solution of linear and nonlinear ordinary differential equations
			CO3	get acquainted and to apply modular arithmetic to computer algorithms
			CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
			CO5	familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB
2	Mathematics-I for Electrical & Electronics Engineering Stream	BMATE101	CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
			CO2	analyze the solution of linear and nonlinear ordinary differential equations
			CO3	apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
			CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
			CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

Semester II				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**
1	Mathematics-II for Computer Science and Engineering stream	BMATS201	CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
			CO2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors. Orthogonal curvilinear coordinates
			CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
			CO4	Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.
			CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB
2	Mathematics-II for Electrical & Electronics Engineering Stream	BMATE201	CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, lineintegral and surface integral.
			CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
			CO3	To understand the concept of Laplace, transform and to solve initial value problems.
			CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
			CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/ SCILAB

Semester III				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**
1	Mathematics for Computer Science	BCS301	CO1	Explain the basic concepts of probability, random variables, probability distribution
			CO2	Apply suitable probability distribution models for the given scenario.
			CO3	Apply the notion of a discrete-time Markov chain and n-step transition probabilities to solve the given problem
			CO4	Use statistical methodology and tools in the engineering problem-solving process.
			CO5	Compute the confidence intervals for the mean of the population.
			CO6	Apply the ANOVA test related to engineering problems.
2	AV Mathematics-III for EC Engineering	BMATEC301	CO1	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory
			CO2	To use Fourier transforms to analyze problems involving continuous-time signals
			CO3	To apply Z-Transform techniques to solve difference equations
			CO4	Understand that physical systems can be described by differential equations and solve such equations
			CO5	Make use of correlation and regression analysis to fit a suitable mathematical model for statistical data

Semester IV				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**
1	DISCRETE MATHEMATICAL STRUCTURES	BCS405A	CO1	Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
			CO2	Demonstrate the application of discrete structures in different fields of computer science.
			CO3	Apply the basic concepts of relations, functions and partially ordered sets for computer representations.
			CO4	Solve problems involving recurrence relations and generating functions.
			CO5	Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering

ELIGIBILITY

- Pass in PUC/10+2 Examination with Physics and Mathematics as compulsory subjects along with one of the chemistry/Computer science/ Electronics/Technical vocational subjects and obtained at least 45% marks (40% in case of candidate belonging to SC/ST category) in the above subjects taken together of any Board recognized by the respective State Governments / Union Territories or any other qualification recognized as equivalent there to.

- The CET / COMEDK Exams (entrance exam) get over; normally the aspiring students would be able to assess their performance and seat allotment possibilities to the college of their preference. Therefore, after CET / COMEDK exams, there would be acceleration in the admission process under Management Quota.
- To have assured seat under Management Quota, it is necessary to secure your seat early by complying with the terms and conditions.

DEPARTMENT OF DEPARTMENT OF PHYSICS

The Department of Physics was started in the year 2001 have highly qualified faculty members with ample experience from Academics. The department has well equipped laboratory; the department has achieved good academic results.

VISION OF THE DEPARTMENT

To provide foundations of Physics for Engineering applications

MISSION OF THE DEPARTMENT

- M_1: To impart basic concepts and principles of Physics applied to Engineering Science.
- M_2: To imbibe the applications of Physics in the area of Lasers, Optical Fibre, Electrical Conductivity and Semiconductors.

SHORT TERM GOALS

- To get consistently excellent results in academics.
- To increase awareness among students about Research Avenues in Basic Sciences.
- To establish a cell for providing consultancy services.
- To establish a knowledge Centre.

LONG TERM GOALS

- To have an All-Doctorate Team of Faculty Members.
- To increase publications in Scopus indexed journals.
- To submit proposals funded projects in R & D activities.
- To strive for obtaining Intellectual Property Rights.

DEPARTMENT RESOURCES

- Well-ventilated class and tutorial rooms equipped with multimedia projectors
- Laboratories with advanced equipment
- Departmental library
- Internet Facility
- Innovative video lecture delivery facility

COURSE CURRICULUM (2022 SCHEME)

Semester I & II	
BPHYS102/202	Laser and Optical Fibers, Quantum Mechanics, Quantum Computing, Electrical Properties of Materials and Applications, Applications of Physics in computing

Semester I &II	
BPHYE102/202	Quantum Mechanics, Electrical Properties of Solids, Lasers and Optical Fibers, Maxwell's Equations and EM waves, Semiconductors and Devices

COURSE OUTCOMES (CO)

Semester I & II				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**
1	Applied Physics for CSE Stream	BPHYS102/ 202	CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
			CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
			CO3	Summarize the essential properties of superconductors and its applications in qubits.
			CO4	Illustrate the application of physics in design and data analysis.
			CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.
2	Applied Physics for EEE Stream	BPHYE102/ 202	CO1	Describe the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
			CO2	Elucidate the concepts of conductors, dielectrics and superconductivity.
			CO3	Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
			CO4	Summarize the properties of semiconductors and the working principles of semiconductor devices.
			CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

LAB DETAILS:

LIST OF EXPERIMENTS

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.

6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(**https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype**)

LAB EQUIPMENT'S:

LCR Resonance Apparatus consisting of: 1.Resonance kit 2.Set of patch cords 3.Signal generator
Four probe Apparatus consisting of: 1.Resistivity of Semiconductor by four probe kit 2.Four probe arrangement and heater
Photo diode characteristics experiment: 1.Regulated power supply 2.Photo diode 3.Digital voltmeter 4.Digital current meter 5.Light source 6.Box
Fermi energy set: 1.Copper coil 2.Thermometer 3.Beaker 4.Multimeter
Magnetic field of circular coil experiment
Transistor characteristics experiment: 1.Transistor set
Dielectric constant experiment:
Wavelength of LASER using grating: 1. Diffraction grating 2.LASER light 3.Scale
Numerical aperture using optical Fiber: 1.Optical Fiber 2.LASER Light 3.Screen 4.Scale
Stop clock

Digital ammeter
Digital voltmeter

ELIGIBILITY

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DEPARTMENT OF DEPARTMENT OF CHEMISTRY

Department of Chemistry has started in the year 2001. The Department is teaching Applied Chemistry at the first-year level of all branches of Engineering courses. The VTU curriculum is designed according to the requirements of all the branches of Engineering.

VISION OF THE DEPARTMENT

To provide foundation knowledge in Frontiers of Chemistry with Sustainability and Environmental emphasis.

MISSION OF THE DEPARTMENT

- **M_1:** To disseminate knowledge of Chemistry in the area of Electrochemistry, Corrosion Science, Engineering Materials, Water Technology, Instrumentation and Green & Sustainable Chemistry.
- **M_2:** To understanding the concepts of alternative energy sources.

SHORT TERM GOALS

- To obtain consistent and excellent results in academics.
- To encourage students to be entrepreneurs through mentoring activity.
- To encourage the faculty members to update their knowledge and skills by way of Publishing, Participating/Organizing Conferences and Workshops.
- To work towards establishing Nanomaterials Energy Research Centre.

LONG TERM GOALS

- To achieve the distinction of being the most sought-after department of chemistry in the vicinity.
- To foster inter departmental collaboration and synergize the efforts towards multi-disciplinary research and development.
- To establish a strong, connect with institutions, universities, and industries of international repute.
- To contribute in the development of innovative ideas towards solving the challenges faced by society.

DEPARTMENT RESOURCES

- Virtual classrooms and several tutorial rooms with multimedia projectors.
- Departmental library
- Internet Facility
- Deionizer Plant

COURSE CURRICULUM (2022 SCHEME)

Semester I & II	
BCHES102/202	Sensors And Energy Systems, MATERIALS FOR Memory AND DISPLAY SYSTEMS, Corrosion and Electrode System, Polymers and Green Fuels, Waste Management

Semester I &II	
BCHEE102/202	Chemistry of Electronic Materials, Energy Conversion and Storage, Corrosion Science and E-waste Management, Nanomaterials and Display Systems, Sensors in Analytical Techniques

COURSE OUTCOMES (CO)

Semester I & II				
Sl. No	**Course Title**	**Course Code**	**CO No.**	**Course Outcomes (COs): The students will be able to**
1	Applied Chemistry for Computer Science &Engineering stream	BCHES102/202	CO1	Identify the terms and applications processes involved in scientific and engineering.
			CO2	Explain the phenomena of chemistry to describe the methods of engineering processes.
			CO3	Explain the phenomena of chemistry to describe the methods of engineering processes.
			CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes.
			CO5	Analyze properties and multidisciplinary situations processes associated with chemical substances in.
2	Chemistry for Electrical and Electronics Engineering stream	BCHEE202/ 202	CO1	Identify the terms and applications processes involved in scientific and engineering
			CO2	Explain the phenomena of chemistry to describe the methods of engineering processes
			CO3	Solve the problems in chemistry that are pertinent in engineering applications

			CO4	Apply the basic concepts of chemistry to explain the chemical properties and processes
			CO5	Analyze properties and multi processes associated with chemical substances in disciplinary situations

LAB DETAILS:

LIST OF EXPERIMENTS:

A–Demonstration (any two) offline/virtual

A1. Chemical Structure drawing using software: Chem Draw or ACD/Chem Sketch

A2. Determination of strength of an acid in Pb-acid battery

A3: Synthesis of Iron-oxide Nanoparticles

A4. Electrolysis of water

B–Exercise (compulsorily any 4 to be conducted)

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using K2Cr2O7

B3. Determination of pKa of vinegar using Ph sensor (Glass electrode)

B4. Determination of rate of corrosion of mild steel by weight loss method

B5. Estimation of total hardness of water by EDTA method

C–Structured Enquiry (compulsorily any 4 to be conducted)

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)

C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method

C4. Estimation of Sodium present in soil/effluent sample using flame photometry

C5. Determination of Chemical Oxygen Demand (COD)of industrial waste water sample

D–OpenEndedExperiments(anytwo)

D1: Evaluation of acid content in beverages by using pH sensors and simulation.

D2. Construction of photovoltaic cell.

D3. Design an experiment to Identify the presence of proteins in given sample.

D4. Searching suitable PDB file and target for molecular docking

LAB EQUIPMENT'S:

1. Balance dial type (rough balance)
2. Chemical balance
3. Calomel electrode
4. Platinum electrode
5. Photoelectric colorimeter
6. Digital ph meter
7. Digital direct reading conductivity meter with cell
8. Glass and calomel (combined electrode)
9. Hot air oven 3 side heater, temp 5-250 c
10. Hot plate (thermostatic)
11. Bunsen burner
12. Flame photometer na and k filter
13. Burettes stand plates
14. De ionizer plant
15. Digital clock
16. Stop watch

ELIGIBILITY

- Pass in PUC/10+2 Examination with Physics and Mathematics as compulsory subjects along with one of the chemistry/Computer science/ Electronics/Technical vocational subjects and obtained at least 45% marks (40% in case of candidate belonging to SC/ST category) in the above subjects taken together of any Board recognized by the respective State Governments / Union Territories or any other qualification recognized as equivalent there to.
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