Programme Matrix: Bachelor of Science- Physics, Mathematics, Electronics [2019 Batch]

Kristu Jayanti College
AUTONOMOUS   Bengaluru
Reaccredited 'A' Grade by NAAC | Affiliated to Bengaluru North University

FACULTY OF SCIENCE

B.Sc. Physics, Mathematics, Electronics

Programme Educational Objectives

PEO1: To provide knowledge on the fundamentals and latest developments in physics.

PEO2: To empower the students with mathematical concepts and tools.

PEO3: To equip the students with knowledge and skills in electronics.

PEO4: To nurture the students with employability skills and professional ethics.

Programme Outcome

After successful completion of three year B.Sc. PME Programme, the graduate will be able to:

PO1: Apply professional and social skills to cater to the needs of the industry, society and global scientific community.

Programme Specific Outcomes

After successful completion of three year B.Sc. PME Programme, the graduate will be able to:

PSO1: Analyze the concepts and theories of physics.

PSO2: Appraise mathematical concepts and reasoning.

PSO3: Create electronic devices to meet global technological demands.

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I Semester

Course Type	Course Code	Course Title	Course Outcome
AECC	AEN103A11	**Additional English I**	1. Describe and differentiate between ballads and sonnets 2. Analyze critically the writing style of prose writers 3. Develop interest to appreciate one act plays 4. Apply the rules of punctuation to write concisely 5. Demonstrate proficiency in creating leaflets and brochures
AECC	HIN103B11	**Hindi I**	• हिन्दी साहित्य के गद्य विधाओं का विश्लेषण करने की क्षमता का विकास • विद्यार्थियों में सामाजिक यथार्थ का मूल्यांकन करने का ज्ञान • सृजनात्मक कौशल्य में परिपूर्णता • गद्य विधाओं के अध्ययन करने के बाद सामाजिक मूल्यों का ज्ञान प्राप्त • अनुवाद कला और भाषा में परिशुद्धता
AECC	KAN103B11	**Kannada I**	• ಜಾನಪದ& ಶಿಷ್ಟ ಸಾಹಿತ್ಯದ ವ್ಯತ್ಯಾಸಚರ್ಚೆ ಮಾಡುವರು • ಸಾಮಾಜಿಕ ಸಮಾನತೆ ಮತ್ತು ಜೀವನಮೌಲ್ಯಗಳ ಮನರಾವಲೋಕನ ಮಾಡುವರು • ಗ್ರಾಮೀಣ ಸಂಸ್ಕೃತಿಯನ್ನು ವಿವರಿಸುವರು • ಕನ್ನಡ ಭಾಷಾಪ್ರೇಮವನ್ನುಇತರೆ ಭಾಷೆಗಳೊಂದಿಗೆ ಹೋಲಿಕೆ ಮಾಡುವರು
AECC	ENG103A11	**English I**	1. To attune young minds to concerns and issues which have a broad and wide scope of use and application to life. 2. To cut across the history of creative expression in focusing primarily on the core values that governs human lives.
DSCC	PHY203B11	**Physics I [Mechanics, Thermodynamics and Kinetic Theory of Gases]**	1. Explain the concept of mechanics, thermodynamics and kinetic theory of gases 2. Evaluate the escape velocity and orbital velocity of the planets. 3. Derive and demonstrate the first law of thermodynamics. 4. Classify thermodynamic processes which are happening in our life cycle.
DSCL	PHY2L1A11	**Physics Practical I**	1. Design experiments and acquire data in order to explore physical principles of motions, effectively communicate results, and critically evaluate related scientific studies. 2. Adopt an understanding of thermodynamics principles effectively. 3. Solve mechanical problems in day to day life.
DSCC	UMT204B11	**Mathematics I [Calculus and Analytical Geometry]**	1. Construct nth derivative of $f(z)=uv$ using Leibnitz's Theorem. 2. Evaluate partial derivatives of algebraic and transcendental functions. 3. Evaluate integral using a reduction formula. 4. Use the equations of line, plane, sphere, cone and cylinder.
DSCC	ELE203A11	**Electronics I [Basic Electronics I]**	1. Design flowchart and algorithms for C program. 2. Construct sequential, iterative problems and input/output operations on text files. 3. Differentiate between decision control structures and loop control structures. 4. Distinguish between data representation through arrays, functions, function using pointers, structures and unions.
DSCL	ELE2L1A11	**Electronics Practical I**	1. Trace sequential, decision making and iterative C programs.

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			2. Design user defined data types and functions in C language.

II Semester

Course Type	Course Code	Course Title	Course Outcome
MIL [Any ONE to be Opted]			
AECC	AEN103A21	**Additional English II**	1. To provide the young learners an introduction to new ideas and issues that bear relevance to our life today. 2. To give the students an opportunity to develop values that will help them adapt to the changing world.
AECC	HIN103B21	**Hindi II**	• काव्य अध्ययन मे संगीतात्मक शैली को समझ लेता है • काव्य विश्लेषण करने की क्षमता • काव्य में निहित विचारों का मूल्यांकन • काव्य सृजन करने का कौशल्य • व्याकरणिक भाषा का ज्ञान एवं स्पष्टता
AECC	KAN103B21	**Kannada II**	• ಕನ್ನಡ ಸಾಹಿತ್ಯದಲ್ಲಿನ ಭಾಷಾ ಮಡಿವಂತಿಕೆಯ ವಿವರಣೆ ತಿಳಿಯುವರು • ಪುರಾಣ ಕಾವ್ಯಗಳಲ್ಲಿನ ಸಾಂಸ್ಕೃತಿಕ ಮುಖಾಮುಖಿಯ ವಿಶ್ಲೇಷಣೆ ಮಾಡುವರು • ನಾಟಕಗಳಲ್ಲಿನ ಪರಿಸರ ವರ್ಣನೆಯ ಪುನರಾವಲೋಕನ ಕೈಗೊಳ್ಳುವರು • ವೃತ್ತಿಆಧಾರಿತ ವ್ಯವಸ್ಥೆ ಬಗ್ಗೆ ಚರ್ಚಿಸುವರು
Compulsory Courses			
AECC	ENG103A21	**English II**	1. Discuss the use of animal imagery and hypersensitive characters in the twentieth century writings 2. Describe poetic style and its devices in the english verses of the victorian age 3. Analyze poems and sonnets regarding existentialist and metaphysical themes 4. Discover and implement new strategies of grammar in speaking english language 5. Integrate the prominence of media and the elements of advertising by creating media awareness
AECC	NES102A01	**Environmental Science**	1. Discuss the overexploitation of natural resources. 2. Appraise the components of the ecosystem.
DSCC	PHY203B21	**Physics II [Properties of Matter, Relativity and Thermodynamics]**	1. Distinguish SHM and motion of particles. 2. Infer the concept of relativity and calculate the speed of the light. 3. Calculate mass - energy equivalence of a system of particles.
DSCL	PHY2L1A21	**Physics Practical II**	1. Prepare set-ups to perform experiments related to thermal conductivity and rigidity modulus. 2. Construct the applications of simple harmonic motion.
DSCC	UMT204B21	**Mathematics II [Algebra and Differential Calculus]**	1. Identify algebraic structures as groups. Construct pedal equation, radius of curvature and evolute. 2. Explain singular point, asymptote and envelope. 3. Solve first order linear and homogeneous differential equations.
DSCC	ELE203A21	**Electronics II [Basic Electronics II]**	1. Explain the working and concept of special transistor devices JFET, MOSFET, UJT. 2. Demonstrate the working of transistors as a power amplifier, oscillator and feedback amplifier. 3. Summarize the inverting, non-inverting and mathematical operations of op-amp.
DSCL	ELE2L1A21	**Electronics Practical II**	1. Develop mathematical operational circuits with inverting and non-inverting amplifiers.

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			2. Design filters and oscillators electronic circuits using operational amplifiers.

III Semester

Course Type	Course Code	Course Title	Course Outcome
MIL [Any ONE to be Opted]			
AECC	AEN103A31	**Additional English III**	1. Appreciate the theme of love and suspense in the works of Alfred Noyes, Robert Southey, Sir Arthur Conan Doyle and Shakespeare 2. Discover the sufferings of human being in the works of Tagore, Mary Fisher, Charley Chaplin, John Steinbeck and Philip Larkin 3. Analyses the dramatic techniques in the prescribed one act play 4. Outline the difference between essay writings and précis writing 5. Develop the interest on poem and prose
AECC	HIN103B31	**Hindi III**	• हिन्दी कविता और खण्डकाव्य के भेद को समझलेता है • पौराणिक कथा का विश्लेषण • पौराणिक आदर्श विचारों का अनुकरण करता है • आधुनिक और पौराणिक विचारों का मूल्यांकन • काव्य सृजन शैली का विकास
AECC	KAN103B31	**Kannada III**	• ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳನ್ನು ಪರಿಚಯಿಸುತ್ತದೆ • ಮಧ್ಯಕಾಲೀನಯುಗದ ಭಕ್ತಿ ಪರಂಪರೆಯೊಂದಿಗೆ ಬದುಕಿನ ವಾಸ್ತವತೆಯನ್ನು ಹೋಲಿಸಿ ಚರ್ಚಿಸುವರು • ಭಾಷೆಯ ಕೌಶಲ್ಯಗಳೊಂದಿಗೆ ವಿಜ್ಞಾನ ಹಾಗೂ ತಾಂತ್ರಿಕ ಚಿಂತನೆಗಳನ್ನು ಗ್ರಹಿಸಲು ಅಗತ್ಯ ಕ್ರಮಗಳನ್ನು ಅರಿಯುವರು • ಯುವಜನಾಂಗವುಅಭಿವೃದ್ಧಿಯಜಗತ್ತಿನಲ್ಲಿ ಹೊಂದಾಣಿಕೆಯಾಗಲು ಸಂವಹನ ಕೌಶಲ್ಯಗಳ ಅಗತ್ಯತೆಯನ್ನುಚರ್ಚಿಸುವರು • ಧರ್ಮ ಮತ್ತು ಪರಂಪರೆಗಳ ಕುರಿತು ಪುನರಾವಲೋಕನ ಮಾಡುವರು
Compulsory Courses			
AECC	ENG103A31	**English III**	1. State the problems of a man and the significance of parental affection in real life 2. Review the historical background of true events in roman history 3. Extrapolate the reflections on the lives of writers in literary genres 4. Interpret the significance of English literature in the forms of movies and serials in media 5. Formulate the structure of oral and written presentations and develop speaking skills
DSCC	PHY203B31	**Physics III [Electricity and Magnetism]**	1. Distinguish between DC and transient currents. 2. Discuss the concept of magnetic field, forces and electromagnetic waves. 3. Demonstrate the concepts of thermoelectricity and thermoelectric series.
DSCL	PHY2L1A31	**Physics Practical III**	1. Design current and voltage theorem circuits. 2. Develop working electronic models based on thermoelectric series experiments.
DSCC	UMT204B31	**Mathematics III [Algebra, Differential Calculus, Improper Integrals and**	1. Explain cyclic group and Lagrange's theorem. 2. Evaluate limit of algebraic and transcendental function using L' Hospital's Rule. 3. Evaluate integral using beta and gamma functions.

		Linear Programming]	4. Formulate a given simplified definition as a linear programming problem and solve using graphical or simplex methods.
DSCC	ELE203A31	**Electronics III [Digital Electronics and Verilog]**	1. Explain the fundamental concept of Boolean algebra and logic gates. 2. Design all combinational and sequential logic circuits. 3. Compile digital circuit programs using circuit simulation software.
DSCL	ELE2L1A31	**Electronics Practical III**	1. Build the circuit with basic logic gates and universal gates. 2. Design combinational and sequential circuits using logic gates.
SEC	SSP4L2A01	**Soft Skills Practices**	1. Build verbal/oral communication, leadership and listening skills. 2. Perform group discussion, presentations and personal interview.

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IV Semester

Course Type	Course Code	Course Title	Course Outcome
MIL [Any ONE to be Opted]			
AECC	AEN103A41	**Additional English IV**	1. Interpret select poems of Robert Frost, Sarojini Naidu and William Blake 2. Explain the style and significant features of prose writings of R. K Narayan, Willa Cather, Doris Lessing, O. Henry, and Booker. T. Washington 3. Compare the ethical and cultural differences in Wole Soyinka's play 'The Lion and the Jewel' and learn the unique native culture of Nigeria 4. Assess the issues related to marriage, education, moral code of conduct, the concept of sublime, modernity, tradition, and the mindsets of human beings in life 5. Appraise the literary devices and techniques used in poetry and prose 6. Formulate grammatically correct sentences using proper punctuations 7. Create citations of books, articles and journals using MLA format 8th edition
AECC	HIN103B41	**Hindi IV**	• हिन्दी व्यंग्य अध्ययन करने की शैली को समझलेता है • व्यंग्य में निहित विचारों का विश्लेषण • व्यंग्य कथाओं में अभिव्यक्त विचारों का मूल्यांकन • निबंधों में निहित आदर्श विचारों का अनुकरण करता है • व्यंग्य सृजन कौशल्य का विकास
AECC	KAN103B41	**Kannada IV**	• ನಮ್ಮ ನಾಡು–ಸಮಾಜ–ಕುಟುಂಬ ಪರಂಪರೆಯಕುರಿತುಅರಿವು ಹಾಗೂ ಕಾಳಜಿಯನ್ನು ಅಧ್ಯಯನಮಾಡುವರು • ಮಹಿಳಾ ಹಕ್ಕುಗಳು ಹಾಗೂ ರಕ್ಷಣೆಯಜವಾಬ್ದಾರಿಯನ್ನು ಸ್ಪಷ್ಟವಾಗಿ ತಿಳಿಯುವರು • ಅರಣ್ಯ ಹಾಗೂ ನೈಸರ್ಗಿಕ ಸಂಪನ್ಮೂಲಗಳನ್ನು ವಿವಿಧ ವಿಷಯಗಳ ಅಧ್ಯಯನದೊಂದಿಗೆಚರ್ಚಿಸುವರು • ಭಕ್ತಿಯಅರ್ಥ, ಗ್ರಹಿಕೆಗಳು, ವಿವಿಧ ನೆಲೆಗಳ ಕುರಿತುಕಾಲಘಟ್ಟದ ಹಿನ್ನಲೆಯಲ್ಲಿ ಹೋಲಿಸುವರು • ಆದರ್ಶಗಳು, ಸಾಮಾಜಿಕ ಸೇವೆ ಈ ಕುರಿತು ಮೌಲ್ಯಾಧಾರಿತ ಬದುಕನ್ನುಕುರಿತು ಪುನರಾವಲೋಕನ ಮಾಡುವರು
Compulsory Courses			
AEEC	ENG103A41	**English IV**	1. Recognize, define, and identify poetic terms and genres 2. Examine novels analytically and interpretively, to identify literary elements of plot, character, setting, tone, point of view, theme, style, symbol, metaphor, and image 3. Analyze the characters and themes of one act plays 4. Acquire vital employability skills and employment opportunities with in-depth knowledge of cv, cover letter, report writing and paragraph writing
DSCC	PHY203A41	**Physics IV [Optics , Laser and Fourier Series]**	1. Define refractive index of materials. 2. Discuss the concepts of optical instruments and properties of lasers. 3. Illustrate the importance and applications of Fourier series in optical phenomena.
DSCL	PHY2L1A41	**Physics Practical IV**	1. Perform experiments to calculate refractive index of glass and liquid. 2. Design optical experiments using spectrometers and lasers.

DSCC	UMT204B41	**Mathematics IV [Algebra, Differential Equations, Laplace Transforms and Fourier Series]**	1. Analyze homomorphism and isomorphism of a group. 2. Solve second and higher order differential equations. 3. Evaluate Laplace transforms and inverse Laplace transforms. 4. Estimate Fourier series for even and odd functions.
DSCC	ELE203A41	**Electronics IV [Communication Systems]**	1. Demonstrate block diagram of basic communication system. 2. Explain transmitting and receiving function of analog modulation techniques. 3. Illustrate the concept of resonant and non-resonant antennas. 4. Appraise block diagram of monochrome and color televisions.
DSCL	ELE2L1A41	**Electronics Practical IV**	1. Design band elimination filters and modulator circuits. 2. Formulate sensitivity, selectivity and fidelity property of radio receiver.
NCCC	LSE5A2A41	**Life Skills Education**	1. Develop self-competency and confidence in their day to day life 2. Evaluate the problems and find the sustainable solutions in their daily life 3. Enhance interpersonal relationship effectively in the community 4. Develop coping mechanisms to manage their stress effectively in their environment

V Semester			
Course Type	**Course Code**	**Course Title**	**Course Outcome**
DSCC	PHY203A51	**Physics V [Statistical Physics and Quantum Mechanics]**	1. Illustrate the normalization for the Boltzmann factor. 2. Classify Fermi-Dirac and Bose-Einstein statistics according to the spin of the particles. 3. Solve the harmonic oscillator Schrodinger equation and its applications. 4. Evaluate the energy Eigen levels and evolution of a particle in a box.
DSCL	PHY2L2A51	**Physics Practical V**	1. Design set-ups to execute experiments related to statistical and

			quantum physics. 2. Construct experimental set-ups for the applications of harmonic oscillator and plank's constant.
DSCC	PHY203A52	**Physics VI [Solid State Physics and Magnetic Materials]**	1. Discuss the concept of solid state physics and magnetic materials. 2. Distinguish between crystalline and amorphous solids. 3. Demonstrate the concepts of x-ray diffraction and magnetism.
DSCL	PHY2L2A52	**Physics Practical VI**	1. Design experiments related to resistivity and magnetic properties of materials. 2. Perform experiments to study electric and magnetic properties of materials. 3. Execute solar cell experiment.
DSCC	UMT204A51	**Mathematics V [Real and Complex Analysis]**	1. Categorize sequences and series to convergent, divergent or oscillatory. 2. Construct analytic functions from complex functions. 3. Evaluate integrals using Cauchy's integral theorem and formula. 4. Compare circles and lines in z-plane and w-plane.
DSCC	UMT204A52	**Mathematics VI [Total and Partial Differential Equations, Algebra and Numerical Analysis]**	1. Solve the partial differential equation of first order using Charpit's method and second order using complementary function and particular integral. 2. Identify rings, integral domain and field. 3. Apply numerical methods to perform interpolation and integration. 4. Solve algebraic and transcendental equations using bisection method, newton's method and secant method.
DSCL	UMT2L2B51	**Mathematics Practical I**	1. Create programs for sequences and series using the Maxima tool. 2. Develop solutions for algebraic, transcendental and partial differential equations using the Maxima tool.
DSCC	ELE203A51	**Electronics V [Advanced Communication Systems]**	1. Demonstrate the concept of pulse and digital modulation technique. 2. Explain the principle and working of radar system. 3. Compare satellite communication, optical fiber communication and cellular communication system.
DSCL	ELE2L2A51	**Electronics Practical V**	1. Design PWM, PPM, PAM modulator and demodulator circuits. 2. Trace the waveform of BPSK, QPSK and FSK modulation using kit.
DSCC	ELE203A52	**Electronics VI [Microprocessor and Microcontroller]**	1. Explain the concept and architecture of microprocessor and microcontroller. 2. Compose programs based on 8085 microprocessor and 8051 microcontroller. 3. Illustrate the concept of external peripheral interfacing with microcontrollers.
DSCL	ELE2L2A52	**Electronics Practical VI**	1. Develop programs to perform arithmetic operations using 8051 microcontrollers. 2. Execute interfacing with DAC, ADC and seven segment display.

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VI Semester			
Compulsory Courses			
DSCC	PHY203A61	**Physics VII [Electronics, Semiconductor and Dielectrics]**	1. Explain fundamental concepts and techniques of digital electronics. 2. Design semiconductor models with respect to carrier densities and carrier transport. 3. Analyze the working of semiconductor p-n diodes and transistors.
DSCL	PHY2L2A61	**Physics Practical VII**	1. Design circuits to execute inverting and non-inverting performance of Op-amp. 2. Perform experiments to study the applications of transistors.
DSCC	PHY203A62	**Physics VIII [Atomic, Molecular and Nuclear Physics]**	1. Describe the changes in behavior of atoms with externally applied electric and magnetic fields. 2. Explain rotational, vibrational, electronic and Raman spectra of molecules. 3. Distinguish fission and fusion processes used in nuclear reactors. 4. Discuss ionizing radiation interaction with matter and the functionality of detectors for radioactivity.
DSCL	PHY2L2A62	**Physics Practical VIII**	1. Manage experimental set-ups to study atomic and molecular spectra. 2. Design experiments to test the relation between photoelectric current and intensity of light.
DSCC	UMT204A61	**Mathematics VII[Vector Calculus and Integral Calculus]**	1. Use curl, divergence and gradient. Solve problems on line and multiple integrals. 2. Evaluate length, area and volume of curves using multiple integrals.
DSCC	UMT204A62	**Mathematics VIII [Matrices, Linear Algebra and Calculus of Variations]**	1. Evaluate rank, inverse, Eigen values and eigen vectors of a matrix and solve systems of linear equations. 2. Explain vector space, subspace, linear span, basis and dimension. 3. Interpret linear transformation and fundamental concepts of rank nullity theorem. 4. Evaluate the extreme value of a functional.
DSCL	UMT2L2B61	**Mathematics Practical II**	1. Create programs for matrices and linear transformations using the Maxima tool. 2. Design Maxima programs to evaluate line and multiple integral.
DSCC	ELE203A61	**Electronics VII [Digital Signal Processing]**	1. Explain the concept of digital signals and discrete systems. 2. Analyze frequency domain data conversion. 3. Illustrate DSP programs using computation software.
DSCL	ELE2L2A61	**Electronics Practical VII**	1. Develop DSP programs to perform folding, shifting, convolution, correlation and DTFT properties. 2. Design Butterworth filters using computational software.
DSCP	ELE2P2A61	**Electronics Project Work**	1. Design and implementation of electronics projects using microprocessor and microcontroller. 2. Develop electronic projects based on filters, amplifiers and transducers.
DSEC	ELEA03A61	**Electronics VIII [Biomedical Electronics]**	1. Explain the function of human body and generation of bio-electrical signals. 2. Demonstrate the function of electrodes and physiological transducers.

			3. Illustrate biomedical recorders, modern imaging systems and patient monitoring system.
DSEC	ELEB03A61	**Electronics VIII [Elements of Nanotechnology and Microwaves]**	1. Demonstrate the basic concept of nanotechnology. 2. Explain the synthesis of nanomaterials and its applications. 3. Illustrate the fundamental concepts of microwave.
DSEC	ELEC03A61	**Electronics VIII [Instrumentation Devices and Systems]**	1. Analyze the characteristic performance of variable resistance, capacitance, inductance and digital transducers. 2. Explain strain measurement and temperature measurement techniques. 3. Apply the concept of transducers for instrumentation amplifiers and data acquisition systems.