

**Institute for Excellence in Higher Education (IEHE),
Bhopal (MP)**



**NAAC Re-accredited (Fourth Cycle) Autonomous College
Under the UGC Scheme with 'A+' Grade (CGPA-3.45)**

**Program Outcomes (POs),
Program Specific Outcome (PSOs)
&
Course Outcomes (COs)
of
Department of Physics & Electronics

B.Sc./B.Sc. (Honours) Electronics

(Session: 2023-2024)**

Programmes offered in the Institute

Under Graduate Programmes

- B.Com. (4-Year UG programme under NEP-2020)
- B.Com. Honours (Management/Account) (3-Year UG programme under old pattern)
- B.A. (Major: Economics/History/Psychology/Sociology/Political-Science/English-Literature/Hindi-Literature/Geography/Fashion Designing) (4-Year UG programme under NEP-2020)
- B.A. Honours (Economics/History/Psychology/Sociology/Political Science/English-Literature/Hindi-Literature/Geography/Fashion-Designing) (3-Year UG programme under old pattern)
- **B.Sc. (Major: Physics/Chemistry/Computer-Science/Mathematics/**Electronics**/Biotechnology/Geography/Forensic-Science/Clinical Nutrition and Dietetics) (4-Year UG programme under NEP-2020)**
- **B.Sc. Honours (Physics/Chemistry/Computer-Science/ Mathematics/**Electronics**/Biotechnology/Geography/Forensic-Science) (3-Year UG programme under old pattern)**
- B.B.A. (4-Year UG programme under NEP-2020) (New)
- B.P.E.S. (3-Year UG programme) (New)

Post Graduate Programmes

- MA (Economics)
- MA (English)
- MA (Hindi) (New)
- MA (History)
- MA (Political Science)
- MA (Psychology) (New)
- MA (Public Administration)
- MA (Sociology) (New)
- MA (Social Work)
- M.Sc. (Biotechnology)
- M.Sc. (Chemistry)
- M.Sc. (Mathematics)
- M.Sc. (Physics)
- M.Com. (Marketing Management)

Courses offered by Vocational Cell (IEHE)

Diploma Courses (16)

1. Diploma in Financial Services (DFS)
2. Diploma in Human Resources Development (DHRD)
3. Diploma in Communicative English (DCE)
4. Diploma in Guidance and Counselling Psychology (DGC)
5. Diploma in Industrial Work & Management System (DIWMS)
6. Diploma in Statistical Analysis (DSA)
7. Diploma in Taxation (DIT)
8. Diploma in Creative Arts (DCrA)
9. Diploma in Computer Application (DCA)
10. Diploma in Tourism & Hospitality Management (DTHM)
11. Diploma in Forensic Science (DFSc.)
12. Diploma in Remote Sensing & GIS (DRSG)
13. Diploma in Hostel Management (DHM) *
14. Diploma in Retail Marketing Management (DRMM)
15. Diploma in Banking Financial Services and Insurance (DBFSAI)
16. Diploma in Data Science and Analysis (DDA) – NEW

Certificate Courses (16)

1. Certificate Courses in English Creative Writing (CECW)
2. Certificate Courses in Research Methodology (CRM)
3. Certificate Courses in Instrumentation & Electronic Maintenance (CIEM)
4. Certificate Courses in Cyber Security (CCS)
5. Certificate Courses in Spoken English (CSE)
6. Certificate Course in Intellectual Property Right (CIPR)
7. Certificate Courses in French Language (CFL)
8. Certificate Courses in Hostel Management (CHM)
9. Certificate Courses in Retail Marketing Management (CRMM)
10. Certificate Courses in Banking Financial Services and Insurance (CBFSAI)
11. Certificate Course in Advance Excel (CCAEE) – NEW
12. Certificate Course in Psychological Assessment and Tool Development (CPATD) – NEW
13. Certificate Course in Basics in Geogebra (CCBG) – NEW
14. Certificate Course in Cooking and Baking (CCCB) – NEW
15. Certificate Course in Emotional Intelligence (CCEI) – NEW
16. Certificate Course in Packaging and Designing (CCPD) - NEW

Training Courses (06)

1. 45 Hours Training Programme in Food Processing & Preservation (FPP)
2. 30 Hours Training Programme in (MATLAB)
3. 30 Hours Training Programme in (SPSS)
4. 30 Hours Training Programme in Tally
5. 30 Hours Training Programme in Traditional Art (TPTA)
6. CII-IWN-IEHE Finishing School

Special Courses

- Foundation Course in Civil Services Examinations (FCCSE)
- Joint Admission Test for M.Sc. (JAM)

Program Outcomes (PO) of the Under-Graduate Courses Offered in the Institute

- PO1: Domain Knowledge:** Capable of demonstrating comprehensive knowledge & understanding of one or more other disciplines that form a part of an undergraduate programme of study.
- PO2: Critical Thinking:** Critically evaluate practices, policies and theories by following scientific approach to knowledge development. Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO3: Problem Solving and Analytical Skills:** Ability to think rationally, analyse situations and solve problems adequately.
- PO4: Information and Digital Literacy:** Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.
- PO5: Communication Skills:** The capacity to communicate effectively using appropriate media, to present complex information in a clear & concise manner. Acquire the learning abilities by focusing on LSRW (Listening, Speaking, Reading & Writing skill, which provide a stage to the students to sharpen their capacity to learn more.
- PO6: Social Interaction and sensitivity towards the societal issues:** Work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group and act together as a group or a team in the interests of a common cause. Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO7: Self-directed & Life-long Learning:** Acquire the potential to engage in independent & life-long learning in the broadest context socio-technological changes. Critical sensibility to live experiences, with self-awareness and reflexivity of both and society.
- PO8: Environment and Sustainability:** Understand the issues of environmental contexts & sustainable development.
- PO9: Moral and Ethical Awareness:** Ability to embrace moral/ ethical values in conducting one's life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
- PO10: Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO11: Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause and effective relationships, define problems, formulate hypotheses, interpret and draw conclusions from data, ability to plan, execute and report the results of an experiment or investigation. Efficiency to apply one's learning to real life situations or in interdisciplinary areas.
- PO12: Leadership and Management Skills:** Competence to use skills in organizing for people to reach a shared goal. During leading a project, ability to motivate others to complete a series of tasks, often according to a schedule.
- PO13: Employability and Entrepreneurial Skill:** Ability to develop employability skills such as, positive attitude, good business sense, willingness to learn, resilience, ability to work under pressure, optimism, adaptability, perseverance and motivation, and a host of similar skills.

Department of Physics & Electronics

PROGRAMME OUTCOMES (PO): B.Sc. (Honours)

Predefined Programme Outcomes	<i>Students taking admission to this program of B.Sc. (Honours) get equipped with following outcomes:</i>
PO1	Domain Knowledge: Acquiring knowledge of fundamentals, basic Mathematics, domain knowledge of proper scientific models and Computing Specialization from defined problems and explaining the basic scientific principles and methods.
PO2	Scientific thinking: Inculcating scientific thinking and awareness, getting an ability to use necessary current techniques, skills, and modern tools.
PO3	Problem Analysis: Identifying, formulating, & analysing complex problems, reaching substantiated conclusions using first principles of Mathematics, natural sciences and electronic sciences.
PO4	Communication: Communicate concepts, designs, and solutions of scientific activities effectively and professionally with society at large.
PO5	Information & Digital Literacy: Capability to use ICT in a variety of learning situations. Demonstrate ability to access, evaluate and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO6	Ethical Awareness: Ability to embrace moral/ ethical values in conducting one's life, possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to support the values required for collaborative work such as mutual trust & fairness.
PO7	Environment & Sustainability: Understanding the impact of scientific solutions on societal and environmental contexts and demonstrate knowledge of and need for sustainable development.
PO8	Self-directed and Life-long Learning: Acquire the ability to engage in independent and life- long learning in the broadest context socio-technological changes. Critical sensibility to live experiences, with self-awareness and reflexivity of both and society.
PO9	Research-related skills: <ul style="list-style-type: none"> • Acquiring familiarity with emerging areas of different subjects in science and their applications in various spheres of sciences and getting appraise of its relevance in future studies. • Getting ability to apply various statistical tools to research problems and ability to build statistical knowledge and knowing the statistical organization in India and abroad. • Developing scientific intuition, ability and techniques to tackle problems either theoretical or experimental in nature.
PO10	Employability Skill: Ability to develop employability skills such as, positive attitude, good business sense, willingness to learn, resilience, ability to work under pressure, optimism, adaptability, perseverance and motivation, and a host of similar skills.

Department of Physics & Electronics

Programme Specific Outcomes (PSO): BSc (Honours) Electronics (*Honours/Major Subject*)

Programme Specific Outcomes	<i>The students taking up this program of BSc with Electronics (Honours/Major) as a special subject of study, receive the following outcomes:</i>
PSO-1	Understand the basic concepts of electronics components, network theorem, digital electronics, solid state semiconductor devices, amplifier theory, Analog and Digital circuits, basic circuits, design using circuit maker Software and their application.
PSO-2	Ability to apply knowledge of mathematics & science in solving electronics related Problems and understand the use of electronics in the field of computer science.
PSO-3	Ability to design and conduct electronics experiments, as well as to analyse and Interpret data.
PSO-4	Ability to design and manage electronic systems or processes that conforms to a given specification within ethical and economic constraints.
PSO-5	Analyse different parameters of various circuits and the Input and output V-I characteristics of the circuits.
PSO-6	To develop the ability to function as a member of a multidisciplinary team with sense of ethics, Integrity and social responsibility by providing them group projects.
PSO-7	To develop the ability to communicate effectively in term of oral and written communication skills by encouraging them for class presentations and project demonstration.
PSO-8	To make students recognize the need for, and be able to engage in lifelong learning by helping them explore the latest trends in Electronics by providing them journals/magazines for scholarly reading.
PSO-9	To incorporate in the student's the ability to use techniques, skills and modern technological/scientific/engineering Software/tools for professional practices.
PSO-10	Understand the application of Electronics in domestic appliances and train them to repair small household electrical and electronics appliances.



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Department of Physics & Electronics

Mapping of PSO's BSc. Electronics (Honours/Major) with POs of Under-Graduate

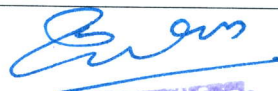
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PSO-1	*	*	*	*	*	*	*	*	*	*
PSO-2	*	*	*	*	*	*	*	*	*	*
PSO-3	*	*	*	*	*	*	--	*	*	*
PSO-4	*	*	*	*	*	*	--	*	*	*
PSO-5	*	*	--	*	*	*	*	*	*	*
PSO-6	*	*	*	*	*	*	*	*	--	*
PSO-7	*	*	*	--	*	*	--	*	*	*
PSO-8	*	*	*	--	*	*		*	*	*
PSO-9	*	*	*	--	--	--	--	*	--	*
PSO-10	*	*	*	--	--	--	--	*	--	*

Course Outcomes (CO)s

Semester: I

Semiconductor Devices: (Paper Code: MJS-175) (Major)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Major) as a special subject of study receive the following outcomes:</i>
CO-1	Describe the basics of electrical properties of Semiconductor materials.
CO-2	Interpret the I-V characteristics of diode/BJT/MOSFET devices.
CO-3	Apply standard device models to explain/calculate critical internal parameters of semiconductor devices.
CO-4	Explain the behaviour and characteristics of power devices such as SCR/UJT etc.
CO-5	Test the electrical properties of various semiconductor devices such as Diode, BJT, JFET, MOSFET, and UJT in Laboratory.
CO-6	Perform the experiment on Trainer Kits in laboratory to prepare the characteristic curve for above mentioned semiconductor devices.


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Semester: I

Basic Circuit & Network Analysis: (Paper Code: MNS-176) (Minor)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Minor) as a special subject of study receive the following outcomes:</i>
CO-1	Describe the construction and working of Basic circuit elements such as Resistor, capacitor and Inductor.
CO-2	Illustrate the basic Circuit laws such as Ohm's law, KVL, KCL, etc.
CO-3	Apply Network Theorems on Complex circuits in order to find the voltage, current and power drawn from a circuit.
CO-4	Analyse the electronics circuit and learn to identify the use of different theorems in order to solve network problems.
CO-5	Measure the current, voltage and power ratings of resistor, capacitor, and inductors using Multimeters.
CO-6	Design circuits using basic components and prepare a detailed analysis of them.

Semester: I

Electronic Circuits and PCB Designing: (Paper Code: GES-175) (Generic Elective)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Generic Elective) as a special subject of study receive the following outcomes:</i>
CO-1	Identify basic circuit elements such as Resistor, capacitor and inductor, connectors and IC's.
CO-2	Understand the working of Resistors, capacitors and inductors to make use of them to construct electronic circuits.
CO-3	Infer the characteristics of operational amplifiers and its effect on output and their compensation techniques.
CO-4	Explain and compare the working of general-purpose applications of op-amp.
CO-5	Measure the current, voltage and power ratings of resistor, capacitor, and inductors using Multimeters.
CO-6	Assemble the components on a Dotted PCB according to the circuit.

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Semester: II

Basic Circuit & Network Analysis: (Paper Code: MJS-275) (Major)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Major) as a special subject of study receive the following outcomes:</i>
CO-1	Describe circuits in a systematic manner suitable for analysis and design.
CO-2	Understands how to formulate circuit analysis problems in a mathematically tractable way with an emphasis on solving linear systems of equations.
CO-3	Analyse the electric circuit using network theorems.
CO-4	Determine Sinusoidal steady state response.
CO-5	Understand the two-port network parameters with an ability to find out two-port network parameters & overall response for interconnection of two-port networks.

Semester: II

Semiconductor Devices: (Paper Code: MNS-276) (Minor)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Minor) as a special subject of study receive the following outcomes:</i>
CO-1	Describe the behaviour of semiconductor materials
CO-2	Reproduce the I-V characteristics of diode/BJT/MOSFET devices.
CO-3	Apply standard device models to explain/calculate critical internal parameters of semiconductor devices.
CO-4	Explain the behaviour and characteristics of power devices such as SCR/ UJT etc.

Semester: II

Digital System Design: (Paper Code: GES-275) (Generic Elective)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Generic Elective) as a special subject of study receive the following outcomes:</i>
CO-1	Understand various number systems.
CO-2	Perform inter conversion of numbers of different number system and Arithmetic operation on numbers of different number system.
CO-3	Simplify Boolean expressions and Describe functions of various Logic gates.
CO-4	Describe various logic families.
CO-5	Describe working of combinational and sequential logic circuits.



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Semester: III

Electronic Circuits (Paper Code: MJS-375) (Major)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronic Circuits (Major) as a special subject of study receive the following outcomes:</i>
CO-1	Define the characteristic equation of Ideal Diode.
CO-2	Understand about the concept of Load Line analysis and represent the use of Diode in Rectification.
CO-3	Outline the various modes of BJT (CB, CE, and CC) and review the working of Transistor as switch and amplifier.
CO-4	Classify and contrast between the various oscillators and detect their output waveform.
CO-5	Discriminate between the different power amplifiers on basis of their overall efficiency.
CO-6	Collect and combine the working of Oscillators in a record file based on observations made in Laboratory using Trainer kits.

Semester: III

Operational Amplifier & Applications (Paper Code: MNS-376) (Minor)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Operational Amplifier & Applications (Minor) as a special subject of study receive the following outcomes:</i>
CO-1	Define the Ideal and Practical Characteristics of Operational-Amplifier.
CO-2	Understand the 741 and 341 Op-amp IC and learn about its pins functions.
CO-3	Infer the working of Op-Amp as Inverting and Non-Inverting amplifier.
CO-4	Analyse the input and output to various Op-Amp applications such as Summing amplifier, subtractor, differentiator, etc.
CO-5	Determine the Circuit connections of IC 741 for various applications OP-amp.
CO-6	Produce the output for Op-amp as Differentiator, Integrator, Schmitt Trigger, Zero Crossing detector.

Semester: III

Electronic Instrumentation (Paper Code: GES-375) (Generic Elective)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronic Instrumentation (Generic Elective) as a special subject of study receive the following outcomes:</i>
CO-1	Identify the parameters necessary for Measuring Instruments.
CO-2	Understand the sources of errors in measuring instruments and how reduce the chances of errors.
CO-3	Illustrate about the various Bridge measurement circuits such as Wheatstone bridge, Kelvin's bridge, Hay's bridge, etc.
CO-4	Analyse the construction and working of Analog and Digital Multimeter.
CO-5	Determine the unknown values of Resistance, Capacitance and Inductance using Various bridge circuit measurement trainer kit.
CO-6	Produce an Oscillating signal on CRO with the help of a function generator.

Semester: III

Design & Fabrication of PCB Using TINA Software (Paper Code: Voc/SEC-XXX) (Voc/SEC)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Design & Fabrication of PCB Using TINA Software (Voc/SEC) as a special subject of study receive the following outcomes:</i>
CO-1	Identify basic circuit elements such as Resistor, capacitor and inductor, connectors and IC's.
CO-2	Understand the working of Resistors, capacitors and inductors to make use of them to construct electronic circuits.
CO-3	Operate Toolkit for Interactive Network Analysis and create a basic circuit on TINA editor using the software's virtual component list.
CO-4	Organize a Virtual Circuit on PC using TINA Software.
CO-5	Test the virtual Circuit using the different input functions available on TINA software.
CO-6	Assemble the components on a Dotted PCB according to the circuit.

Semester: IV

Operational Amplifier & Applications (Paper Code: MJS-475) (Major)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Operational Amplifier & Applications (Major) as a special subject of study receive the following outcomes:</i>
CO-1	Define the Ideal and Practical Characteristics of Operational-Amplifier.
CO-2	Understand the 741 and 341 Op-amp IC and learn about its pins functions.
CO-3	Infer the working of Op-Amp as Inverting and Non-Inverting amplifier.
CO-4	Analyze the input and output to various Op-Amp applications such as Summing amplifier, subtractor, differentiator, etc.
CO-5	Determine the Circuit connections of IC 741 for various applications OP-amp.
CO-6	Specify the output for Op-amp as Differentiator, Integrator, Schmitt Trigger, Zero Crossing detector.

Semester: IV

Electronic Circuits (Paper Code: MNS-476) (Minor)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronic Circuits (Minor) as a special subject of study receive the following outcomes:</i>
CO-1	Define the characteristic equation of Ideal Diode.
CO-2	Understand about the concept of Load Line analysis and represent the use of Diode in Rectification.
CO-3	Outline the various modes of BJT (CB, CE, and CC) and review the working of Transistor as switch and amplifier.
CO-4	Classify and contrast between the various oscillators and detect their output waveform.
CO-5	Discriminate between the different power amplifiers on basis of their overall efficiency.
CO-6	Collect and combine the working of Oscillators in a record file based on observations made in Laboratory using Trainer kits.

Semester: IV

Fundamentals of Microprocessor (Paper Code: GES-476) (Generic Elective)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Fundamentals of Microprocessor (Generic Elective) as a special subject of study receive the following outcomes:</i>
CO-1	Define the Architectural design of Microprocessor INTEL 8085-A.
CO-2	Understand the various Pins of Microprocessor INTEL 8085-A and be familiar with function of each pin.
CO-3	Illustrate the different addressing modes and instruction set of 8085
CO-4	Categorize the interfacing of Memory with Microprocessor 8085
CO-5	Conclude the Timing diagram of different instructions based on their memory mapping.
CO-6	Develop software programs in assembly language for microprocessor 8085.

Semester: IV

Basic Instrumentation Skill (Paper Code: Voc/SEC-XXX) (Voc/SEC)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Basic Instrumentation Skill (Voc/SEC) as a special subject of study receive the following outcomes:</i>
CO-1	Identify the basic electronic components such as Voltage source, resistor, capacitor, inductor, etc.
CO-2	Understand the correct method to use multimeter to measure voltage, current and resistance.
CO-3	Illustrate about the various Bridge measurement circuits such as Wheatstone bridge, Kelvin's bridge, Hay's bridge, etc.
CO-4	Analyze the construction and working of Multimeter, Signal Generator and Oscilloscope.
CO-5	Determine the unknown values of Resistance, Capacitance and Inductance using Various bridge circuit measurement trainer kit.
CO-6	Produce an Oscillating signal on CRO with the help of a function generator.

Semester: V

Digital Electronics and VHDL: (Paper Code: MJS-575)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-I) as a special subject of study receive the following outcomes:</i>
CO-1	Understand and represent numbers in powers of base of different Number Systems and converting one from the other.
CO-2	Carry out arithmetic operations.
CO-3	Understand basic logic gates, concepts of Boolean algebra and techniques to reduce/simplify Boolean expressions
CO-4	Analyse and design combinatorial as well as sequential circuits.
CO-5	Explain the concepts related to PLD's.
CO-6	Use VLSI design methodologies to understand and design simple digital systems & understand the HDL design flow and capability of writing programs in VHDL.
CO-7	To get familiar with Simulation and Synthesis Tools.

Signature
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एवं विज्ञान प्रकृष्टता संस्था
कोटा

Department of Physics & Electronics

Semester: V

Signals & Systems: (Paper Code: DSE-a)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Represent various types of continuous-time and discrete-time signals
CO-2	Understand concept of convolution, LTI systems and classify them based on their properties and determine the response of LTI system
CO-3	Determine the impulse response, step response and frequency response of LTI systems
CO-4	Analyse system properties based on impulse response and Fourier analysis.
CO-5	Analyse the spectral characteristics of continuous-time periodic and Discrete-Time periodic signals using Fourier analysis
CO-6	Understand Laplace transform and its properties and Laplace transform to obtain impulse and step response of simple circuits.

Semester: V

Electromagnetics: (Paper Code: DSE-b)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Understand the fundamentals of Electrostatics and Magneto statics hence get the insight of the characteristics of materials and their interactions with electric and magnetic fields
CO-2	Understand the application of Vector Differential and Integral operators in Electromagnetic Theory.
CO-3	Interpret Maxwell's equations in differential and integral forms, both in time and frequency domains.
CO-4	Describe the complex ϵ , μ , and σ , plane waves, Snell's laws from phase matching, and calculate the reflection and transmission coefficients at the interface of simple media
CO-5	Calculate input impedance and reflection coefficient of an arbitrarily terminated transmission-line and can use Smith chart to convert these quantities.

Semester: V

Electrical Circuits and Network Skills: (Paper Code: SEC-a)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Familiarize with the type of devices/components that may be mounted on PCB
CO-2	Familiarize with TINA (Toolkit for Interactive Network Analysis) Software and effectively use it for circuit designing and simulations.
CO-3	Understand the PCB layout techniques for optimized component density and power saving.
CO-4	Perform design and printing of PCB with the help of various image transfer and soldering techniques.
CO-5	Understand the trends in the current PCB industry.



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एन सी ई आर उद्योगिक शिक्षा विभाग

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Department of Physics & Electronics

Semester: V

Computation and Visualization with Scilab: (Paper Code: SEC-b)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Implement the concept of vectors & matrices in Scilab programming.
CO-2	Able to apply the programming concept like branching, iteration & functions in a Scilab program.
CO-3	Use the inbuilt functions of Scilab for trigonometric & statistical calculations .
CO-4	Analyze and visualize the data through various 2-D and 3-D plots
CO-5	Apply Scilab tools in modelling and simulations
CO-6	Use Scicos visual editor (Xcos) in various simulations of scientific importance.

Semester: VI


Microprocessor and Microcontrollers: (Paper Code: MJS-675)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-I) as a special subject of study receive the following outcomes:</i>
CO-1	Understand and describe the basic blocks of microcomputers i.e., CPU, Memory, I/O and architecture of microprocessors and Microcontroller's.
CO-2	Apply knowledge and demonstrate proficiency of designing hardware interfaces for memory and I/O as well as write assembly language programs for target microprocessor and microcontroller
CO-3	Derive specifications of a system based on the requirements of the application and select the appropriate Microprocessor or Microcontroller

Semester: VI

Communication Electronics: (Paper Code: DSE-a)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Design basic digital communication systems to solve a given communications problem and they become conversant with the requirements and the protocols employed in the fundamental components in a communication network.
CO-2	Understand and describe simple block forward error correction codes and basic dispersion compensation concepts and also the concepts of up/down conversion and modulation
CO-3	Determine the suitability of a particular communication system to a given problem
CO-4	Describe the concept of "noise" in analog and digital communication systems. Also, get insight on the trade-offs (in terms of bandwidth, power, and complexity requirements) in basic digital communication systems.


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 कोबाज

Semester: VI

Fundamentals of Fiber Optic Communication: (Paper Code: DSE-b)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Understand the advantages of fiber optic communication over other waveguides and mediums.
CO-2	Identify elements of an optical fiber transmission link.
CO-3	Understand the various fiber optic performance parameters such as acceptance angle, numerical aperture, optical power, etc.
CO-4	Calculate and stimulate the signal power for optical transmission link.
CO-5	Understand the structure, performance and signal analysis for a fiber optic link.
CO-6	Calculate power losses for an input signal in a Fiber Link.
CO-7	Design and analyse the signal transmission using optical fiber cables.

Semester: VI


C Programming & Data Structure: (Paper Code: DSE-c)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Write code in C language for arithmetic and logical problems
CO-2	Implement conditional branching, iteration and recursion.
CO-3	Use concept of modular programming by writing functions and using them to form a complete program
CO-4	Understand the concept of arrays, pointers and structures and use them to develop algorithms and programs for implementing searching and sorting.

Semester: VI

Transmission Lines, Antenna and Wave Propagation: (Paper Code: DSE-d)

Course Outcomes	<i>The students taking up this course of BSc (Honours) with Electronics (Honours-II/Subsidiary) as a special subject of study receive the following outcomes:</i>
CO-1	Describe the principals of electromagnetic wave propagation and various effects involved in it.
CO-2	Explain the phenomenon of transmission line and its types.
CO-3	Perform calculation for finding out performance parameters of transmission lines like losses SWR.
CO-4	Understand the modes of transmission in waveguides and other components involved in microwave communications.


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 कोयंबटूर

A brief note on Bloom's Taxonomy:

According to the revised version of Bloom's Taxonomy there are six levels of cognitive learning. Each level is conceptually different. The six levels are (1) remembering, (2) understanding, (3) applying, (4) analyzing, (5) evaluating, and (6) creating. We follow the Bloom's Taxonomy in deciding the course outcome & the levels (1/2/3/4/5/6) are displayed in the mapping table of COs with the PSOs of each program of NEP-2020. Details of the terms used in the levels are as follows:

Level-1: **REMEMBER** - this level include:

cite, define, describe, identify, label, list, match, name, outline, quote, recall, report, reproduce, retrieve, show, state, tabulate, and tell.

Level-2: **UNDERSTAND** - this level include:

abstract, arrange, articulate, associate, categorize, clarify, classify, compare, compute, conclude, contrast, defend, diagram, differentiate, discuss, distinguish, estimate, exemplify, explain, extend, extrapolate, generalize, give examples of, illustrate, infer, interpolate, interpret, match, outline, paraphrase, predict, rearrange, reorder, rephrase, represent, restate, summarize, transform, and translate.

Level-3: **APPLY** - this level include:

apply, calculate, carry out, classify, complete, compute, demonstrate, dramatize, employ, examine, execute, experiment, generalize, illustrate, implement, infer, interpret, manipulate, modify, operate, organize, outline, predict, solve, transfer, and use.

Level-4: **ANALYZE** - this level include:

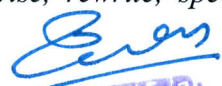
analyze, arrange, break down, categorize, classify, compare, contrast, deconstruct, detect, diagram, differentiate, discriminate, distinguish, divide, explain, identify, integrate, inventory, order, organize, relate, separate, and structure.

Level-5: **EVALUATE** - this level include:

appraise, apprise, argue, assess, compare, conclude, consider, contrast, convince, criticize, critique, decide, determine, discriminate, evaluate, grade, judge, justify, measure, rank, rate, recommend, review, score, select, standardize, support, test, and validate.

Level-6: (highest level): **CREATE** - this level include:

arrange, assemble, build, collect, combine, compile, compose, constitute, construct, create, design, develop, devise, formulate, generate, hypothesize, integrate, invent, make, manage, modify, organize, perform, plan, prepare, produce, propose, rearrange, reconstruct, reorganize, revise, rewrite, specify, synthesize, and write.


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Department of Physics & Electronics

Programme: BSc (Major/Honours-I)

Subject: Electronics

Mapping of COs with PSOs for Semester-I (Major)

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
Paper Title: Semiconductor Devices Paper Code: MJS-175	CO1	1									
	CO2	2				2					
	CO3		3							3	
	CO4	1									
	CO5			5							
	CO6			6						6	

Mapping of COs and PSOs for Semester-II (Major)

Paper Title: Basic Circuit & Network Analysis Paper Code: MJS-275	CO1	1									
	CO2	1									
	CO3		3	3						3	
	CO4					4					
	CO5			5		5					
	CO6			6						6	

Mapping of COs and PSOs for Semester-III (Major)

Paper Title: Electronic Circuits Paper Code: MJS-375	CO1	1									
	CO2	1									
	CO3	1									
	CO4	2									
	CO5	4									
	CO6			6		6				6	

Mapping of COs and PSOs for Semester-IV (Major)

Paper Title: Operational Amplifier & Applications Paper Code: MJS-475	CO1	1									
	CO2	1									
	CO3	1									
	CO4			4							4
	CO5				5						
	CO6			6	6					6	

Mapping of COs and PSOs for Semester-V (Major)

Paper Title: Digital Electronics and VHDL: (Paper Code: MJS-575)	CO1	1									
	CO2	2	2								
	CO3	3									
	CO4		4	4							
	CO5			5				5			
	CO6			6							
	CO7							7			

Department of Physics & Electronics

Mapping of COs and PSOs for Semester-VI (Major)

Microprocessor & Microcontrollers: (Paper Code: MJS-675)	CO1	1									
	CO2	2	2								
	CO3	3		3							

Programme: BSc (Minor/Honours-II/Subsidiary)

Subject: Electronics

Mapping of COs with PSOs for Semester-I (Minor)

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
<i>Paper Title:</i> Basic Circuit & Network Analysis	CO1	1									
	CO2	1									
	CO3		3	3						3	
	CO4					4					
<i>Paper Code:</i> MNS-176	CO5			5		5					
	CO6			6						6	

Mapping of COs and PSOs for Semester-II (Minor)

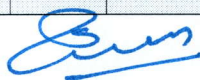
<i>Paper Title:</i> Semiconductor Devices	CO1	1									
	CO2	2				2					
	CO3		3							3	
<i>Paper Code:</i> MNS-276	CO4	1				1					
	CO5			5		5					
	CO6			6						6	

Mapping of COs and PSOs for Semester-III (Minor)

<i>Paper Title:</i> Operational Amplifier & Applications	CO1	1									
	CO2	1									
	CO3	1									
	CO4			4							4
<i>Paper Code:</i> MNS-376	CO5				5						
	CO6			6	6					6	

Mapping of COs and PSOs for Semester-IV (Minor)

<i>Paper Title:</i> Electronic Circuits	CO1	1									
	CO2	1									
	CO3	1									
<i>Paper Code:</i> MNS-476	CO4	2									
	CO5	4									
	CO6			6		6				6	


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Programme: BSc (Discipline Specific Elective)
Mapping of COs with PSOs for Semester-V (DSE-a)

Subject: Electronics

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
Paper Title: Signals & Systems: (Paper Code:) DSE-a)	CO1	1	1								
	CO2	2									
	CO3		3								
	CO4		4	4							
	CO5			5							
	CO6	6									

Mapping of COs and PSOs for Semester V (DSE-b)

Paper Title: Electromagnetics: (Paper Code: DSE-c)	CO1	1									
	CO2	2									
	CO3		3								
	CO4	4									
	CO5		5								

Mapping of COs and PSOs for Semester VI (DSE-a)

Paper Title: Communication Electronics: (Paper Code: DSE-a)	CO1			1							
	CO2	2									
	CO3	3									
	CO4	4	4								

Mapping of COs with PSOs for Semester-VI (DSE-b)

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
Paper Title: Fundamentals of Fiber Optic Communication: (Paper Code: DSE-b)	CO1	1									
	CO2	2									
	CO3	3									
	CO4		4								
	CO5	5									
	CO6		6								
	CO7		7	7	7						

Mapping of COs and PSOs for Semester VI (DSE-c)

Paper Title: C Programming & Data Structure: (Paper Code: DSE-c)	CO1	1									
	CO2		2	2							
	CO3		3	3							
	CO4	4	4	4	4						

Mapping of COs and PSOs for Semester VI (DSE-d)

Paper Title: Transmission Lines, Antenna and Wave Propagation: (Paper Code: DSE-d)	CO1	1									
	CO2	2	2								
	CO3		3	3							
	CO4	4									

Department of Physics & Electronics

Programme: BSc (Generic Elective/Vocational) Subject: Electronics

Mapping of COs with PSOs for Semester-I (Generic Elective)

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
Paper Title: Electronic Circuits and PCB Designing Paper Code: GES-175	CO1	1									
	CO2	2									
	CO3	3									
	CO4	4									
	CO5			5						5	
	CO6			6						6	

Mapping of COs and PSOs for Semester II (Generic Elective)

Paper Title: Digital System Design Paper Code: GES-275	CO1	1									
	CO2	2									
	CO3		3								
	CO4	4									
	CO5			5						5	
	CO6					6				6	

Mapping of COs and PSOs for Semester III (Generic Elective)

Paper Title: Electronic Instrumentation Paper Code: GES-375	CO1	1									
	CO2	2									
	CO3	3									
	CO4		4								
	CO5			5		5					
	CO6			6		6				6	

Mapping of COs and PSOs for Semester IV (Generic Elective)

Paper Title: Fundamental of Microprocessor Paper Code: GES-475	CO1	1									
	CO2	2									
	CO3	3									
	CO4	4									
	CO5	5									
	CO6									6	

Mapping of COs and PSOs for Semester III (Voc/SEC)

Paper Title: Design & Fabrication of PCB Using TINA Software Paper Code: Voc/SEC-XXX	CO1	1									
	CO2	2									
	CO3	3									
	CO4	4									
	CO5			5						5	
	CO6			6						6	

[Signature]
निदेशाचारक

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Mapping of COs and PSOs for Semester IV (Voc/SEC)

Paper Title: Basic Instrumentation Skill	CO1	1								
	CO2	2								
	CO3	3								
Paper Code: Voc/SEC-XXX	CO4		4							
	CO5			5		5				
	CO6			6		6			6	

Mapping of COs and PSOs for Semester V (Voc/SEC)

Paper Title: Electrical Circuits and Network Skills: (Paper Code: SEC-a)	CO1	1								
	CO2		2	2	2				2	
	CO3	3								
	CO4		4	4	4				4	
Paper Code: Voc/SEC-XXX	CO5	5								

Mapping of COs and PSOs for Semester V (Voc/SEC)

Paper Title: Computation and Visualization with Scilab: (Paper Code: SEC-b)	CO1		1							
	CO2		2	2					2	
	CO3		3	3					3	
	CO4			4	4				4	
Paper Code: Voc/SEC-XXX	CO5		5	5					5	
	CO6		6	6					6	



(IQAC Coordinator)





(Convenor, Academic Committee)

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(HOD, Physics & Electronics)

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