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

NAAC Re-accredited (Third Cycle) Autonomous College
Under the UGC Scheme with 'A' Grade (CGPA-3.10)

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

B.Sc. (Honours) Electronics

(Session: **2022-2023**)

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 (14)

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

Certificate Courses (10)

1. Certificate Courses in English Creative Writing (**CECW**)
2. Certificate Courses in Embedded System (**CES**)
3. Certificate Courses in Research Methodology (**CRM**)
4. Certificate Courses in Instrumentation & Electronic Maintenance (**CIEM**)
5. Certificate Courses in Cyber Security (**CCS**)
6. Certificate Courses in Spoken English (**CSE**)
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)**

Training Courses (06)

1. 45 Hours Training Programme in Food Processing & Preservation
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
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.

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

Predefined Programme Outcomes	***Students taking admission to this program of B.Sc. (Honours) get equipped with following outcomes:***
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:** • 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.

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

Programme Specific Outcomes	***The students taking up this program of BSc with Electronics (Honours/Major) as a special subject of study, receive the following outcomes:***
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.

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	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Major)****as a special subject of study receive the following outcomes:***
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.

Semester: I

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

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Minor)* ***as a special subject of study receive the following outcomes:***
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	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Generic Elective)* ***as a special subject of study receive the following outcomes:***
CO-1	**Identify** basic circuit elements such as Resistor, capacitor and inductor, connectors and IC's.
CO-2	**Understand** the working od 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.

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

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Major)* ***as a special subject of study receive the following outcomes:***
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	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Minor)* ***as a special subject of study receive the following outcomes:***
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	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Generic Elective)* ***as a special subject of study receive the following outcomes:***
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.

Semester: III

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

Course Outcomes	***The students taking up this course of** BSc (Honours) **with** Electronic Circuits (Major) **as a special subject of study receive the following outcomes:***
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	***The students taking up this course of** BSc (Honours) **with** Operational Amplifier & Applications (Minor) **as a special subject of study receive the following outcomes:***
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	***The students taking up this course of** BSc (Honours) **with** Electronic Instrumentation (Generic Elective) **as a special subject of study receive the following outcomes:***
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	***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:***
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	***The students taking up this course of*** *BSc (Honours)* ***with*** *Operational Amplifier & Applications (Major)* ***as a special subject of study receive the following outcomes:***
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 amplier.
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, Schimett Trigger, Zero Crossing detector.

Semester: IV

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

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronic Circuits (Minor)* ***as a special subject of study receive the following outcomes:***
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	***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:***
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	***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:***
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
Fundamentals of Microprocessor 8085 and Interfacing Devices: (Paper Code: **S-575**) (Honours-I)

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Honours-I)* ***as a special subject of study receive the following outcomes:***
CO-1	**Understand** 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	**Familiarise** with different addressing modes and instruction set of 8086
CO-4	**Understand** the interfacing of Microprocessor INTEL 8085-A with IC's such as 8257, 8259, etc.
CO-5	**Developing** software programs in assembly language for microprocessor 8085.

Semester: V

Introduction to Communication Systems: (Paper Code: **S-576**) (Honours-II/Subsidiary)

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Honours-II/Subsidiary)* ***as a special subject of study receive the following outcomes:***
CO-1	**Apply** the basic knowledge of signals and systems and understand the basics of communication system and analog modulation techniques.
CO-2	**Apply** the knowledge of digital electronics and understand the error control coding techniques.
CO-3	**Summarize** different types of communication systems and its requirements.
CO-4	**Learn** in detail about sky wave and ground wave communication.
CO-5	**Design** and analyse the performance of Digital communication systems.

Semester: VI

Advance Microprocessor 8086 & Interfacing Devices: (Paper Code: **S-675**) (Honours-I)

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Honours-I)* ***as a special subject of study receive the following outcomes:***
CO-1	**Understand** the Architectural design of Microprocessor INTEL 8086.
CO-2	**Understand** the various Pins of Microprocessor INTEL 8086 and be familiar with function of each pin.
CO-3	**Familiarise** with different addressing modes and instruction set of 8086.
CO-4	**Understand** Memory-mapping in 8086 and understand the operation of clock generation using IC- 8284.
CO-5	**Developing** software programs in assembly language for microprocessor 8086.

Semester: VI

Basics of Fibre Optic Communication System: (Paper Code: **S-676**) (Honours-II/Subsidiary)

Course Outcomes	***The students taking up this course of*** *BSc (Honours)* ***with*** *Electronics (Honours-II/Subsidiary)* ***as a special subject of study receive the following outcomes:***
CO-1	**Understand** the advantages of fiber optic communication over waveguides & mediums.
CO-2	**Identify** elements of an optical fiber transmission link and calculate and stimulate the signal power for optical 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 and calculate power losses for an input signal in a Fiber Link design and analyse the signal transmission using optical fiber cables.

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.

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 (Honours-I)

Paper Title: ***Fundamentals of Microprocessor 8085 and Interfacing Devices*** *Paper Code:* ***S-575***	CO1	1									
	CO2	2									
	CO3	3									
	CO4	4									
	CO5	5									
	CO6									6	

Mapping of COs and PSOs for Semester-VI (Honours-I)											
Paper Title: ***Advance Microprocessor 8086 & Interfacing Devices*** *Paper Code:* ***S-675***	CO1	1									
	CO2	2									
	CO3	3									
	CO4	4									
	CO5	5									
	CO6									6	

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
Paper Title: ***Basic Circuit & Network Analysis*** *Paper Code:* ***MNS-176***	CO1	1									
	CO2	1									
	CO3		3	3						3	
	CO4					4					
	CO5			5		5					
	CO6			6						6	
Mapping of COs and PSOs for Semester-II (Minor)											
Paper Title: ***Semiconductor Devices*** *Paper Code:* ***MNS-276***	CO1	1									
	CO2	2				2					
	CO3		3							3	
	CO4	1				1					
	CO5			5		5					
	CO6			6						6	
Mapping of COs and PSOs for Semester-III (Minor)											
Paper Title: ***Operational Amplifier & Applications*** *Paper Code:* ***MNS-376***	CO1	1									
	CO2	1									
	CO3	1									
	CO4			4							4
	CO5				5						
	CO6			6	6					6	
Mapping of COs and PSOs for Semester-IV (Minor)											
Paper Title: ***Electronic Circuits*** *Paper Code:* ***MNS-476***	CO1	1									
	CO2	1									
	CO3	1									
	CO4	2									
	CO5	4									
	CO6			6		6				6	

Mapping of COs and PSOs for Semester-V (Honours-II/Subsidiary)											
Paper Title: ***Introduction to Communication Systems*** *Paper Code:* ***S-576***	CO1	1									
	CO2	2									
	CO3		3								
	CO4	4									
	CO5	5									
	CO6			6	6					6	
Mapping of COs and PSOs for Semester-VI (Honours-II/Subsidiary)											
Paper Title: ***Basics of Fibre Optic Communication System*** *Paper Code:* ***S-676***	CO1	1									
	CO2	2									
	CO3	3									
	CO4					4					
	CO5	1									
	CO6			6		6				6	

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	
Mapping of COs and PSOs for Semester IV (Voc/SEC)											
Paper Title: ***Basic Instrumentation Skill*** *Paper Code:* ***Voc/SEC-XXX***	CO1	1									
	CO2	2									
	CO3	3									
	CO4		4								
	CO5			5		5					
	CO6			6		6				6	

29/8/2022

(IQAC Coordinator) (Convenor, Academic Committee) (HOD, Physics & Electronics)

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उच्चशिक्षा उत्कृष्टता संस्थान
भोपाल

29.08.22

(Dr Pragyesh Kumar Agrawal)
Director
Director
Institute for Excellence In Higher Education, Bhopal (M.P.)