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: 2021-2022)

COURSES OFFERED IN THE INSTITUTE

Under Graduate Courses

- B.Com. Honours (Management/Account)
- B.A. Honours (Economics/History/Psychology/Sociology/Political Science/English Literature/Hindi Literature/Geography/Fashion Designing)
- **B.Sc. Honours** (Physics/Chemistry/Mathematics/**Electronics**/Biotechnology/Geography/Forensic-Science)

Post Graduate Courses

- MA (English)
- MA (Economics)
- MA (Social Work)
- MA (History)
- MA (Public Administration)
- MA (Political Science)
- M.Com. (Management)
- **M.Sc. (Physics)**
- M.Sc. (Chemistry)
- M.Sc. (Biotechnology)
- M.Sc. (Mathematics)

Diploma Programme

- 14 Vocational Programmes

Certificate Programme

- 31 Vocational Programmes

Training Programmes

- 09 Vocational Programmes

Special Programmes

- 03 Vocational Programmes

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: 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 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: I

Basic Circuit & Network Analysis: 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	Study 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: I
Electronic Circuits and PCB Designing: 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	Study circuits in a systematic manner suitable for analysis and design.
CO-2	Reproduce the I-V characteristics of P-N junction Diodes.
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	Familiarize with the type of devices /components that may be mounted on PCB

Semester: II
Basic Circuit & Network Analysis: 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	Study 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: 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: 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
Advanced Electronic Instrumentation: S-375 (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	To educate them about Analog to digital and vice-versa conversion techniques and study about counters, oscillators, filters.
CO-2	To educate them about errors in electronic measurement systems & their significance.
CO-3	Familiarize them about the construction, working, advantages and applications of Digital Voltmeter.
CO-4	Familiarize them about the construction, working, advantages and applications of Signal Generators and their use for signal analysis.
CO-5	Introduction to Optical Fibre Communication system. Fibre cable design & specifications.

Semester: III
Measuring Techniques and Instruments: S-376 (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	Recognise and categorise basic measuring instruments based on their principle of operation.
CO-2	Study Bridge Measurement.
CO-3	Learn to use measuring instruments like voltmeter, ammeter, ohmmeter for measuring Voltage, current and resistance respectively.
CO-4	Study the internal structure and working mechanism of Digital Multimeter
CO-5	Study the internal construction of Cathode Ray Oscilloscope and learn its usage for observing Time varying waveforms

Semester: IV
Sensors and Transducers: S-475 (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 nature and general usage of Sensors and transducers in Electronic Systems.
CO-2	Categorize the various sensors according to their working principle viz resistive type, capacitive type, inductive type, etc.
CO-3	Understand the material properties for designing sensors for Strain, displacement, velocity, Flow measurement.
CO-4	Study about Digital transducers such as GPIB, etc.
CO-5	Deducing practical solutions using various sensors to solve day-to-day life problems.

Semester: IV
Circuit Analysis and Network Theory: S-476 (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	Study 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: V
Fundamentals of Microprocessor 8085 and Interfacing Devices: 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: 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: 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: 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.

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	*		*	*	*		*	*	*	*
	CO2	*		*	*	*		*	*	*	*
	CO3	*		*	*	*		*	*	*	*
	CO4	*		*	*	*		*	*	*	*
Mapping of COs and PSOs for Semester-II (Major)											
Paper Title: ***Basic Circuit & Network Analysis*** *Paper Code:* ***MJS-275***	CO1	*	*	*	*	*	*		*	*	*
	CO2	*	*	*	*	*	*	*	*	*	*
	CO3	*	*	*	*	*	*	*	*	*	*
	CO4	*	*	*	*		*	*			*
	CO5	*	*	*	*	*	*				*
Mapping of COs and PSOs for Semester-III (Honours-I)											
Paper Title: ***Advanced Electronic Instrumentation*** *Paper Code:* ***S-375***	CO1	*	*	*	*			*			*
	CO2	*	*	*	*	*		*	*	*	*
	CO3	*	*	*	*		*	*	*	*	*
	CO4	*	*	*	*		*	*	*	*	*
	CO5	*	*	*	*			*			*
Mapping of COs and PSOs for Semester-IV (Honours-I)											
Paper Title: ***Sensors and Transducers*** *Paper Code:* ***S-475***	CO1	*					*		*		*
	CO2	*		*		*	*	*	*		*
	CO3	*					*	*	*		*
	CO4	*		*			*	*	*	*	*
	CO5	*		*			*	*	*	*	*
Mapping of COs and PSOs for Semester-V (Honours-I)											
Paper Title: ***Fundamentals of Microprocessor 8085 and Interfacing Devices*** *Paper Code:* ***S-575***	CO1	*						*	*		*
	CO2	*						*	*		*
	CO3	*			*			*	*		*
	CO4	*						*	*		*
	CO5	*	*	*	*		*	*	*	*	*
Mapping of COs and PSOs for Semester-VI (Honours-I)											
Paper Title: ***Advance Microprocessor 8086 & Interfacing Devices*** *Paper Code:* ***S-675***	CO1	*						*	*		*
	CO2	*						*	*		*
	CO3	*						*	*		*
	CO4	*			*			*	*		*
	CO5	*	*	*	*		*	*	*	*	*

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***	CO1	*	*	*	*	*	*		*	*	*
	CO2	*	*	*	*	*	*	*	*	*	*
	CO3	*	*	*	*	*	*	*	*	*	*
Paper Code: ***MNS-176***	CO4	*	*	*	*		*	*			*
	CO5	*	*	*	*	*	*				*
Mapping of COs and PSOs for Semester-II (Minor)											
Paper Title: ***Semiconductor Devices***	CO1	*		*	*	*		*	*	*	*
	CO2	*		*	*	*		*	*	*	*
	CO3	*		*	*	*		*	*	*	*
Paper Code: ***MNS-276***	CO4	*		*	*	*		*	*	*	*
Mapping of COs and PSOs for Semester-III (Honours-II/Subsidiary)											
Paper Title: ***Measuring Techniques and Instruments***	CO1	*	*	*	*			*	*	*	*
	CO2	*	*	*	*			*	*	*	*
	CO3	*	*	*	*			*	*	*	*
Paper Code: ***S-376***	CO4	*	*	*	*			*	*	*	*
	CO5	*	*	*	*			*	*	*	*
Mapping of COs and PSOs for Semester-IV (Honours-II/Subsidiary)											
Paper Title: ***Circuit Analysis and Network Theory***	CO1	*	*	*	*	*	*		*	*	*
	CO2	*	*	*	*	*	*	*	*	*	*
	CO3	*	*	*	*	*	*	*	*	*	*
Paper Code: ***S-476***	CO4	*	*	*	*		*	*			*
	CO5	*	*	*	*	*	*				*
Mapping of COs and PSOs for Semester-V (Honours-II/Subsidiary)											
Paper Title: ***Introduction to Communication Systems***	CO1	*	*	*	*		*	*		*	*
	CO2	*	*	*	*		*	*		*	*
	CO3	*		*				*	*		
Paper Code: ***S-576***	CO4	*		*				*	*		*
	CO5	*		*	*		*	*		*	*
Mapping of COs and PSOs for Semester-VI (Honours-II/Subsidiary)											
Paper Title: ***Basics of Fibre Optic Communication System***	CO1	*						*	*		
	CO2	*	*	*	*	*	*	*	*	*	*
	CO3	*	*	*	*	*		*	*	*	*
Paper Code: ***S-676***	CO4	*	*	*	*		*	*	*	*	*
	CO5	*	*	*	*	*	*	*	*	*	*

Programme: BSc (Generic Elective) *Subject:* ***Electronics***

Mapping of COs with PSOs for Semester-I

Course		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	PSO10
Paper Title: ***Electronic Circuits and PCB Designing*** *Paper Code:* ***GES-175***	CO1	*	*	*	*	*	*	*		*	*
	CO2	*	*	*	*	*				*	*
	CO3	*	*	*	*	*	*		*		*
	CO4	*	*	*	*	*	*		*		*
	CO5	*	*	*	*	*	*	*	*	*	*

Mapping of COs and PSOs for Semester II

Paper Title: ***Digital System Design*** *Paper Code:* ***GES-275***	CO1	*	*	*	*		*	*		*	*
	CO2	*	*	*	*		*	*		*	*
	CO3	*	*	*	*		*	*		*	*
	CO4	*	*	*	*		*	*		*	*
	CO5	*	*	*	*		*	*		*	*

26/09/21

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

संयोजक
अकादमिक समिति
उच्चशिक्षा उत्कृष्टता संस्थान
भोपाल

विभागाध्यक्ष
भौतिकी एवं इलेक्ट्रॉनिक्स
उच्च शिक्षा उत्कृष्टता संस्थान
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(Dr Pragyesh Kumar Agarwal)
Director

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