UNIVERSITY OF JAMMU

(NAAC ACCREDITED 'A ++' GRADE' UNIVERSITY)
Baba Sahib Ambedkar Road, Jammu-180006 (J&K)

Academic Section
Email: academicsectionju14@gmail.com

NOTIFICATION
(25/Aug/Adp./50)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, is pleased to authorize the adoption of the syllabi and courses of studies for **Post Graduate Programme** in **Electronics** under **NEP-2020** as per details given below:-

Two Year Post Graduate Programme under NEP-2020

Subject	Semester	For the examinations to be held in the year
Electronics	Semester-I	December 2025, 2026 and 2027
	Semester-II	May 2026, 2027 and 2028
	Semester-III	December 2026, 2027 and 2028
	Semester-IV	May 2027, 2028 and 2029

One Year Post Graduate Programme under NEP-2020

Subject	Semester	For the examinations to be held in the year
Electronics	Semester-I	December 2026, 2027 and 2028
	Semester-II	May 2027, 2028 and 2029

The Syllabi of the courses are also available on the University website: www.jammuuniversity.ac.in

Sd/-
DEAN ACADEMIC AFFAIRS

No. F. Acd/II/25/ 7799-7828
Dated: 29/8/2025
Copy for information and necessary action to:

1. Dean, Faculty of **Science**
2. Director/Convener, Board of Studies in **Electronics.**
3. Director, Centre for IT Enabled services and Management, University of Jammu for information and for uploading on University Website.
4. All members of the Board of Studies
5. Joint Registrar (Evaluation/P.G. Exam.)
6. Programmer, Computer Section, Examination Wing

Bhupca 21/8/25
Joint Registrar (Academic)

21/8 21/8/25 21/08/25

PG Syllabi 2026 (One Year M.Sc. Electronics under NEP 2020; Total Credits: 48) Programme Code-PGFSE006												
S.No.	**Course No.**	**Course Title**	**No. of credits**	**Credit Level**	**Credit Points**	**Course Type** Core/ Elective/ Any Other	**Marks**		**Nature of Course** Global/ National/ Regional/ Skill	**SWAYAM /MOOC**	**Vocational Course**	**Research Project/ Summer Internship/ Dissertation**
							Theory	**Practical**				
Semester I												
1	P1ELTC101	Digital Signal Processing	4	6.5	26	Core	100	--	Global	---	---	---
2	P1ELTC102	Electronic Communication Systems	4	6.5	26	Core	100	---	Global	---	---	---
3	P1ELTC103	Industrial Electronics and Control Systems	4	6.5	26	Core	100	---	Global	---	---	---
4	P1ELTC104	Device Fabrication Technology	4	6.5	26	Core	100	---	Global	---	---	---
5	P1ELPC105	Lab course on Digital Signal Processing	2	6.5	13	Core	--	50	Global	---	---	---
6	P1ELPC106	Lab course on Electronic Communication Systems	2	6.5	13	Core	--	50	Global	---	---	---
7	P1ELPC107	Lab course on Industrial Electronics and Control systems	2	6.5	13	Core	---	50	Global	---	---	---
8	P1ELPC108	Seminar	2	6.5	13	Core	----	50	Global			
Total Credits = 24												
Semester II												
9	P1ELTC201	Smart Sensors and Instrumentation Systems	4	6.5	26	Core	100	---	Global	---	---	---
10	P1ELTC202	Data Communication	4	6.5	26	Core	100	---	Global	---	---	---
11	P1ELRC203	Research	16	6.5	104	Core	---	400	Skill	---	---	Research Project and Dissertation
Total Credits = 24												

Program Specific Outcomes (PSOs): At the end of one year MSc Electronics program, the student will understand and be able to explain different branches of Electronics such as Digital Signal Processing, Electronics Communication Systems, Industrial Electronics and Control Systems, Electronic Measurements and Domestic Appliances, Smart Sensors and Instrumentation Systems, Data Communication and Device Fabrication Technology besides hands on training on various laboratory courses. The student will be able to execute a short research project incorporating techniques of basic and advanced electronics under the supervision of faculty member. The student will be equipped to take up a suitable position in industry/academia.

Course Specific Outcomes

Semester-I

COURSE TITLE: Digital Signal Processing
COURSE NO: P1ELTC101

At the end of the course, the students would be able to

- Understand the principles of DSP
- Understand the working of DSP processors
- Understand discrete transforms and their applications
- Design DSP processors based systems

COURSE TITLE: Electronic Communication Systems
COURSE NO: P1ELTC102

At the end of the course, the students would be able to

- Understand different signals and operations performed on them.
- Describe the different techniques of analog modulation and demodulation.
- Understand the principles of digital modulation and demodulation.
- Understand information theory and coding techniques.

COURSE TITLE: Industrial Electronics and Control systems
COURSE NO: P1ELTC103

At the end of the course, the students would be able to

- Understand various power semiconductor devices such as P-MOSFET, SCR, DIAC, TRIAC, GTO etc.
- Understand the basic principle of phase control, cycloconverter, buck converters, boost converters etc.
- Describe PWM inverters, HVDC system, static circuit breakers etc.
- Use standard test signals to identify performance characteristics of 1^{st} and 2^{nd} order systems.
- Apply Root locus, Nyquist and Bode plot stability criterion.

COURSE TITLE: Device Fabrication Technology
COURSE NO: P1ELTC104

At the end of the course, the students would be able to

- Understand the basics of IC fabrication.
- Understand the basics of lithography, etching, NEMS, MEMS etc.
- Have knowledge of various thin film deposition and characterization techniques.
- Know the fabrication of IC passive components, Memory devices and CMOS technology.

Semester-II

COURSE TITLE: Smart Sensors and Instrumentation Systems
COURSE NO: P1ELTC201

At the end of the course, the students would be able to

- Understand the important transduces and sensors.
- Understand the working of biomedical instruments.
- Apply electronic principles for agriculture development.
- Sensors and networking principles to IoT based system design.

COURSE TITLE: Data Communication
COURSE NO: P1ELTC202

At the end of the course, the students would be able to

- Understand different Network topologies.
- Describe the principles of wireless and mobile communication.
- Understand the principle and techniques of optical communication.
- Describe the satellite communication techniques and radar principle.

COURSE TITLE: Research
COURSE NO: P1ELRC203

- This course will equip students with practical skills, enhance problem-solving abilities and foster research-based learning.
- Students will develop the ability to apply theoretical knowledge to real world problems besides analyzing, designing and implementing solutions.
- Students will gain experience in teamwork, communication and project management.

One Year P. G. Syllabi in the subject of Electronics under NEP 2020
(M. Sc. Electronics 1st Semester)

One Year P. G. Syllabi in the subject of Electronics, **M. Sc. Electronics, Semester-I** under NEP 2020 for the examinations to be held in the years mentioned below:

Semester-I: Validity December 2026, 2027 and 2028			
	Course Title	**Course Code**	**Credits**
1.	Digital Signal Processing (4 Credits)	P1ELTC101	**24**
2.	Electronic Communication Systems (4 Credits)	P1ELTC102	
3.	Industrial Electronics and Control systems (4 Credits)	P1ELTC103	
4.	Device Fabrication Technology (4 Credits)	P1ELTC104	
5.	Lab course on Digital Signal Processing (2 Credits)	P1ELPC105	
6.	Lab course on Electronic Communication Systems (2 Credits)	P1ELPC106	
7.	Lab course on Industrial Electronics and Control systems (2 Credits)	P1ELPC107	
8.	Seminar (2 Credits)	P1ELPC108	

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC101

Course No: P1ELTC101 (Core Course)
Title: **Digital Signal Processing**
Credits: 4
Test I & Test II: 40 Marks
Validity: December 2026, 2027 and 2028 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60 Marks

Course Objectives
Understanding of basic principles of digital signal processing and DSP processors based implementation of industrial systems.

Course Outcomes
At the end of the course the students should be able to

- Understand the principles of DSP
- Understand the working of DSP processors
- Understand discrete transforms and their applications
- Design DSP processors based systems

UNIT I Introduction
Elements of digital signal processing; advantages of digital over analog signal processing; discrete time signals as array of values; standard discrete time signals; classification of discrete time signals; discrete time systems; classifications of discrete time systems; linear time invariant systems; difference equations; correlation; A/D conversion process.

UNIT II Discrete transforms
DFT, IDFT, and their properties; Radix-2 DIT FFT algorithm; Radix-2 DIF FFT algorithm; circular convolution; Z transform; properties of Z transform; inverse Z transform; system function and pole zero plots from Z transform; causality and stability in terms of Z transform; computation of Z transform; computation of coefficients of a difference equation from pole zeros; linear convolution using Z transform; relationship between Fourier transform and Z transform; Goertzel algorithm; chirp-Z transform.

UNIT III Filter design
Comparison of analog and digital filters; examples of FIR and IIR filters; ideal filter characteristics; realization of ideal filters; IIR filter design by approximation of derivatives; IIR filter design by impulse invariance; inherent stability of FIR filters; symmetric and antisymmetric FIR filters; linear phase in FIR filters; FIR filter design using windowing; FIR filter design using frequency sampling; FIR differentiators; design of Hilbert transformers; filter design using pole-zero placement.

UNIT IV DSP processors and applications
Commercial digital processing devices; architecture of TMS32OC54xx; on-chip peripherals; interrupts of TMS32OC54XX; data addressing modes of TMS32OC54xx; memory space of TMS32OC54xx processors; program control, instructions and programming; pipeline operation of TMS32OC54xx; serial interface; external bus interfacing signals; memory interface; parallel I/O interface; programmed I/O; direct memory access (DMA); CODEC interface circuit; DSP based bio-telemetry receiver; speech processing system; image processing system.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC101

References

1. J. S. Chitode, Digital signal processing, Technical Publications, Pune.
2. Johnny R. Johnson, Introduction to digital signal processing, Prentice-Hall of India Private Limited, New Delhi.
3. Richard G. Lyons, Understanding digital signal processing, Pearson education Asia, India.
4. Alan V. Oppenheim, Discrete signal processing, Prentice-Hall of India Private Limited.
5. Sanjit K. Mitra, Digital signal processing: a computer based approach, Tata McGraw-Hill.
6. Avatar Singh and S. Srinivasan, Digital signal processing, Thomson Learning, 2004.
7. E. C. Ifeachor, B. W. Jervis, Digital signal processing: A practical approach, Pearson Education.
8. B. Venkataramani and M. Bhaskar, Digital Signal Processors, TMH, 2002.
9. Peter Pirsch, Architectures for digital signal processing, John Weily, 2007

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II.** Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC102

Course Code: P1ELTC102 (Core Course)
Title: **Electronic Communication Systems**
Credits: 4
Test I & Test II: 40
Validity: December 2026, 2027 and 2028 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60

Course Objectives

To acquaint the students with different signals and their operations, analog and digital modulation techniques, information theory and coding techniques.

Course Outcomes

At the end of the course the students should be able to

- Understand different signals and operations performed on them.
- Describe the different techniques of analog modulation and demodulation.
- Understand the principles of digital modulation and demodulation.
- Understand information theory and coding techniques.

UNIT I Signals and Systems

Signals: Classification, Singularity functions: Step, Impulse & Ramp, Fourier transform and its properties; FT of periodic signals; Convolution; Energy and Power signals, Parseval's theorem for energy and power signals, Energy and power spectral densities, Correlation and Autocorrelation, Random variables: Discrete, continuous & their probability density functions; Noise, Noise temperature and Noise figure.

UNIT II Analog Modulation

AM and its spectrum, generation by square law modulation; AM demodulation by square law demodulator and envelope detector; DSBSC: Spectrum, Generation (Balanced modulator) Detection (Synchronous detection); SSB modulation; Generation by frequency discriminator & phase discriminator methods and Synchronous detection; VSB: Generation, Detection.

Time and Frequency-Division Multiplexing.

Angle modulation: Phase and FM; NBFM; WBFM; Generation of FM by Direct and Indirect method, FM discriminator.

UNIT III Digital Modulation

Sampling Theorem, Natural and Flat-top sampling; PAM & PTM, PCM: Quantization and BW; Companding; Differential PCM; Delta modulation; Adaptive delta modulation; Shift keying: ASK, FSK, PSK, and QPSK with generation and reception.

UNIT IV Information Theory and Coding

Basic concepts of information theory; Information measure; Entropy; Information rate; Discrete memory less channel, Channel types; Joint and Conditional entropy; Mutual information; Channel capacity; Shannon's Theorem; Shannon-Hartley Theorem; Trade-off between S/N and BW; Coding: Source coding, Entropy coding & Channel coding; Error detection and correction.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC102

References

1. **Principles of Communication Systems**, H. Taub, D.L. Schilling and G. Saha, Tata McGraw-Hill.
2. **Modern Digital and analog Communication Systems**, B.P. Lathi, Oxford University Press.
3. **Communication Systems**, Simon Haykin, John Wiley and Sons.
4. **Theory and Problems of Analog and Digital Communications**, Hwei P. Hsu, Schaum's Outline Series, McGraw-Hill.
5. **Communication Systems**, R.P. Singh and S.D. Sapre, Tata McGraw-Hill.
6. **An Introduction to the Principles of Communication Theory**, J.C. Hencock, Tata McGraw-Hill.
7. **Communication Systems,** A.B. Carlson, P.B. Crilly and J.C. Rutledge, McGraw-Hill.
8. **Information, modulation, and noise,** Schwartz, McGraw-Hill.
9. **Principles of Electronic Communication**, P.K. Ghosh, Universities Press.

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II**. Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC103

Course No: P1ELTC103 (Core Course)
Title: **Industrial Electronics and Control systems**
Credits: 4
Test I & Test II: 40 Marks
Validity: December 2026, 2027 and 2028 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60 Marks

Course objectives

To impart knowledge on various power semiconductor devices, SMPS, converters, inverters along with their applications. It further aims to provide the basic concepts of control systems.

Course Outcomes

At the end of the course students should be able

- To understand various power semiconductor devices such as P-MOSFET, SCR, DIAC, TRIAC, GTO etc.
- To understand the basic principle of phase control, cycloconverter, buck converters, boost converters etc.
- To describe PWM inverters, HVDC system, static circuit breakers etc.
- To use standard test signals to identify performance characteristics of 1st and 2nd order systems.
- To apply Root locus, Nyquist and Bode plot stability criterion.

Unit I Power Semiconductor Devices

Power diode: basic structure, characteristics and types; power transistor: steady-state characteristics; power MOSFET: P-MOSFET characteristics and applications, comparison of P-MOSFET with BJT; IGBT: basic structure, equivalent circuit, working, latch-up, characteristics, applications and comparison with MOSFET; Thyristors: characteristics, thyristor turn-on methods, two-transistor model of thyristor, introduction to PUT, SUS, SCS, DIAC, TRIAC and GTO.

Unit II Converters

Phase controlled rectifiers: principle of phase control, single phase half-wave circuit with RL load, single phase half-wave circuit with RL load and free-wheeling diode; single phase full-wave converters: mid-point and bridge converters; choppers: principle of chopper operation, step up choppers, types of choppers (A, B, C and D); Buck converters, Boost converters, Derived converters.

Unit III SMPS and Inverters

Switched mode power supply (SMPS): flyback, push-pull, half-bridge and full bridge converters; uninterrupted power supplies (UPS); inverters: single phase bridge inverters, voltage control in single phase inverter, pulse width modulated (PWM) inverters, principle of cycloconverter operation; high voltage DC transmission (HVDC): types of HVDC link, bipolar HVDC system, control of HVDC converters; static switches: single phase AC switches and DC switches; static circuit breakers: ac and dc circuit breakers.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC103

Unit IV Control systems

Open loop and closed loop system; transfer function, block diagram algebra: reduction of block diagram; signal flow graph: Mason's gain formula; control actions: proportional, derivative, integral and PID control. Standard test signals, time response of 1st and 2nd order systems; time response specifications: rise time, peak time, peak overshoot, settling time; concept of steady state errors and error constant; Routh and Hurwitz stability criterion; relative stability analysis; root locus technique: concepts and construction of root loci; Bode plot and Nyquist stability criterion.

References

1. I. J. Nagrath, M. Gopal, Control systems engineering, New age International publishers.
2. B. S. Manke, Linear Control Systems, Khanna Publishers.
3. Kuo, Automatic control systems, Prentice-Hall of India, New Delhi.
4. P. S. Bimbhra, Power Electronics, Khanna Publishers.
5. S. K. Bhattacharya and S. Chatterjee, Industrial electronics and controls, Tata McGraw Hill, New Delhi.
6. Mohammad H. Rashid, Power electronics circuits, devices, and applications, Prentice-Hall of India, New Delhi.

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II.** Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC104

Course No: P1ELTC104 (Core Course)
Title: **Device Fabrication Technology**
Credits: 4
Test I & Test II: 40 (20+20)
Validity: Dec 2026, 2027 and 2028 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60 marks

Course objectives
This course is designed to provide a deep understanding of IC fabrication technology, various thin film deposition and characterization techniques.

Course outcomes
After learning the course, the students should be able to:

- To understand the basics of IC fabrication.
- To understand the basics of lithography, etching, NEMS, MEMS etc.
- To have knowledge of various thin film deposition and characterization techniques.
- To know the fabrication of IC passive components, Memory devices and CMOS technology.

UNIT I Fabrication principles
Crystal growth techniques: Czochralski method and Float zone method; epitaxy: VPE and MBE; Oxidation: Thermal oxidation, Kinetics of growth; Diffusion: Basic diffusion process, diffusion equation; Ion implantation: range of implanted ions, ion distribution, ion stopping; Implantation damage, Annealing: Conventional and Rapid thermal annealing (RTA).

UNIT II Lithography and Etching
Lithography: Optical lithography, clean room, exposure tools, masks, photo resist, pattern transfer; Electron-beam lithography: Electron resist, Proximity effect; X-ray lithography, Extreme-UV & Ion-beam lithography.
Etching: Wet chemical etching and Dry etching; Metallization,
Isolation methods: p-n junction isolation, Mesa Isolation & Oxide isolation

UNIT III Thin film deposition and Characterization
Thin film deposition techniques: Physical vapor deposition (PVD): Sputtering, E-beam PVD; Advantages and disadvantages of PVD; Chemical vapor deposition (CVD): Low-Pressure CVD (LPCVD), Plasma-Enhanced CVD (PECVD); Advantages and disadvantages of CVD; Sol-Gel and Spin coating techniques;
Characterization Techniques: XRD, TEM, SEM, EDX.

UNIT IV Integrated Devices
Integrated passive components: Resistor, Capacitor, Inductor
MOSFET Technology: Basic fabrication process, Memory devices, CMOS technology: Well formation technology, Advanced isolation technology, Gate engineering technology, Challenges for Microelectronics: Scaling of MOS devices, Challenges for integration, System on a Chip.
Basics of MEMS & NEMS.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELTC104

References

1. S. M. Sze, Semiconductor devices, Physics and technology, John Wiley & Sons.
2. S. M. Sze, VLSI Technology, McGraw-Hill International.
3. Sorab K. Gandhi, VLSI fabrication principles, John Wiley & Sons.
4. K. L. Chopra, Thin Film Phenomena, McGraw Hill.

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	**Syllabus to be covered in the examination**	**Time allotted for the examination**	**%Weightage (Marks)**
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II**. Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELPC105

Course No: P1ELPC105 (Core Course)
Title: **Lab course on Digital Signal Processing**
Credits: 2
Semester Exam: 25
Validity: December 2026, 2027 and 2028 Exams

Duration of Examination: 2 Hours

Max. Marks: 50
Sessional Assessment: 25

Each student has to perform a total of six experiments using MATLAB/PYTHON/Embedded-C/Cross-compiler. The teacher in-charge may add or delete experiments as per the availability of the equipment and need of the course with the authorization of the Head of the Department.

List of Experiments

1. To generate a sinusoidal signal.
2. To implement a FIR filter.
3. To implement an IIR filter.
4. To implement DFT.
5. To record and process speech using data acquisition system.
6. To understand and process ECG signal.
7. To implement a filter on DSP kit.
8. To record and process heart sounds.
9. To acquire and process a noisy image.
10. To enhance a stored image using histogram based analysis.
11. To synthesize amplitude modulated signal.
12. To generate amplitude demodulated signal.

Scheme of Examination

<table>
<tr><th>MCQ on LMS + Subjective Test</th><th>Time allotted for the examination</th><th colspan="3">%Weightage (Marks)</th></tr>
<tr><td>Mid Term appraisal</td><td>2 hours</td><td colspan="3">25% (12.5)</td></tr>
<tr><td rowspan="2">External Examination</td><td rowspan="2">2 hours</td><td rowspan="2">75% (37.5)</td><td>50% (25)</td><td>Project report</td></tr>
<tr><td>25% (12.5)</td><td>Viva-Voce</td></tr>
<tr><td colspan="2">Total</td><td colspan="3">50</td></tr>
</table>

External Practical/ Research (thesis/project/patent) examination

External Practical/ Research examination shall be conducted by Board of Examiners consisting of Head of the Department, one/two Senior Professors of concerned department, concerned teacher and outside expert to be appointed by the Vice-Chancellor out of the panel to be provided by the Head of the Department who shall evaluate/assess final practical performance/ dissertation of the students.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELPC106

Course No: P1ELPC106 (Core Course) Duration of Examination: 2 Hours
Title: **Lab course on Electronic Communication Systems**
Credits: 2 Max. Marks: 50
Semester Exam: 25 Sessional Assessment: 25
Validity: December 2026, 2027 and 2028 Exams

Each student has to perform a total of six experiments. The teacher in-charge may add or delete experiments as per the availability of the equipment and need of the course with the authorization of the Head of the Department.

List of Experiments

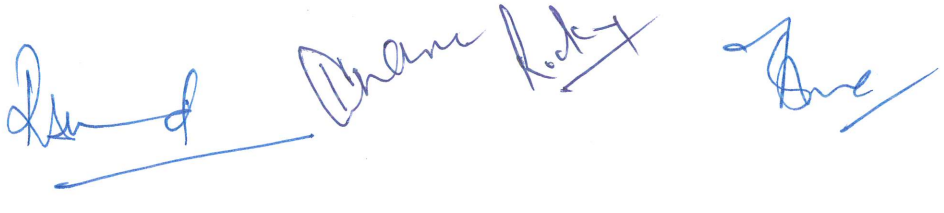
1. Study of Amplitude modulation.
2. Study of Amplitude demodulation.
3. Study of frequency modulation.
4. Study of frequency demodulation.
5. Study of Pulse modulation.
6. Study of Pulse demodulation.
7. Study of delta modulation & demodulation.
8. Study of adaptive delta modulation & demodulation.
9. Calculation of noise figure.
10. Study of FSK/PSK system.

Scheme of Examination

<table>
<tr><th>MCQ on LMS + Subjective Test</th><th>Time allotted for the examination</th><th colspan="3">%Weightage (Marks)</th></tr>
<tr><td>Mid Term appraisal</td><td>2 hours</td><td colspan="3">25% (12.5)</td></tr>
<tr><td rowspan="2">External Examination</td><td rowspan="2">2 hours</td><td rowspan="2">75% (37.5)</td><td>50% (25)</td><td>Project report</td></tr>
<tr><td>25% (12.5)</td><td>Viva-Voce</td></tr>
<tr><td colspan="2">Total</td><td colspan="3">50</td></tr>
</table>

External Practical/ Research (thesis/project/patent) examination

External Practical/ Research examination shall be conducted by Board of Examiners consisting of Head of the Department, one/two Senior Professors of concerned department, concerned teacher and outside expert to be appointed by the Vice-Chancellor out of the panel to be provided by the Head of the Department who shall evaluate/assess final practical performance/ dissertation of the students.



M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELPC107

Course No: P1ELPC107 (Core Course) Duration of Examination: 2 Hours

Title: **Lab course on Industrial Electronics and Control Systems**

Credits: 2 Max. Marks: 50

Semester Exam: 25 Sessional Assessment: 25

Validity: December 2026, 2027 and 2028 Exams

Each student has to perform a total of six experiments. The teacher in-charge may add or delete experiments as per the availability of the equipment and need of the course with the authorization of the Head of the Department.

List of Experiments

1. To study SCR characteristics.
2. To study and obtain the characteristics of DIAC.
3. To study and obtain the waveforms for single-phase half-wave controlled converter.
4. To study IGBT characteristics.
5. To study IGBT applications.
6. To study and obtain the characteristics of TRIAC.
7. To perform experiment on single phase PWM inverter.
8. To study the effect of proportional integral derivative controller on the unit step response of feedback control system.
9. To study PID controller with second order system.
10. To study PI and PD controller using square wave input.

Scheme of Examination

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<tr><th>MCQ on LMS + Subjective Test</th><th>Time allotted for the examination</th><th colspan="3">%Weightage (Marks)</th></tr>
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<tr><td rowspan="2">External Examination</td><td rowspan="2">2 hours</td><td rowspan="2">75% (37.5)</td><td>50% (25)</td><td>Project report</td></tr>
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External Practical/ Research (thesis/project/patent) examination

External Practical/ Research examination shall be conducted by Board of Examiners consisting of Head of the Department, one/two Senior Professors of concerned department, concerned teacher and outside expert to be appointed by the Vice-Chancellor out of the panel to be provided by the Head of the Department who shall evaluate/assess final practical performance/ dissertation of the students.

M. Sc. Electronics
1st Semester (NEP 2020)
(for the examinations to be held in the years 2026, 2027 and 2028)
Course No: P1ELPC108

Course No: P1ELPC108 (Core Course) Title: **Seminar**
Credits: 2 Max. Marks: 50
Validity: December 2026, 2027 and 2028 Exams

Course Objectives
This course aims at exposing the students to recent and upcoming developments in the field of Electronics.

Course Outcomes
- This course will enhance knowledge of the students on emerging fields in the domain of Electronics.
- It will help the students to identify different research areas for taking project work in final semester of MSc programme.
- It will help the students to identify different research areas for pursuing research after completion of MSc programme.

Course Scheme
The students are required to make a detailed presentation on any latest topic falling in the Electronics domain duly approved by the Departmental Affairs Committee under the supervision of a faculty member from the department. The seminar will be of one hour duration including questions and answer session.

Scheme of Examination
The students shall be examined internally by Board of Examiners consisting of Head of the Department and other faculty members with following details:

Presentation: 25 marks Viva Voce examination: 25 marks

One Year P. G. Syllabi in the subject of Electronics under NEP 2020
(M. Sc. Electronics 2nd Semester)

One Year P. G. Syllabi in the subject of Electronics, **M. Sc. Electronics, Semester-II** under NEP 2020 for the examinations to be held in the years mentioned below:

Semester-II: Validity May 2027, 2028 and 2029			
Course Title		**Course Code**	**Credits**
1. Smart Sensors and Instrumentation Systems	(4 Credits)	P1ELTC201	**24**
2. Data Communication	(4 Credits)	P1ELTC202	
3. Research	(16 Credits)	P1ELRC203	

M. Sc. Electronics
2nd Semester (NEP 2020)
(for the examinations to be held in the years 2027, 2028 and 2029)
Course No: P1ELTC201

Course No: P1ELTC201 (Core Course)
Title: **Smart Sensors and Instrumentation Systems**
Credits: 4
Test I & Test II: 40 Marks
Validity: May 2027, 2028 and 2029 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60 Marks

Course Objectives

Understanding of basic principles of advanced instrumentation used for biomedical, agriculture, and IoT based applications.

Course Outcomes

At the end of the course the students should be able to

- Understand the important transduces and sensors
- Understand the working of biomedical instruments
- Apply electronic principles for agriculture development
- Sensors and networking principles to IoT based system design

UNIT I Basics transducers

Transducers: pressure transducers, temperature measurement, pulse sensors, tachometers, displacement, flow, humidity, thickness, pH, position; medical measurement constraints; interfering and modifying inputs; compensation techniques; electrical activity of excitable cells; electrode-electrode interface; polarization; electrode-skin interface and motion artifact, introduction to MEMS and their applications.

UNIT II Biomedical Instrumentation

Introduction to ENG, EMG, ERG, EEG, MEG systems; electrocardiograph: functional diagram, problems, transient protection; interference reduction circuits; intracellular electrodes; evoked potential; fetal electrocardiography; blood pressure measurements; heart sounds; computer tomography; magnetic resonance imaging; apnoea detectors; fetal monitoring; transmission of physiological signals over telephone lines; short wave and microwave diathermy; protection by power distribution and equipment design; physiological effects of electricity.

UNIT III Agro and environmental instrumentation

Functional analysis of agriculture machines; thermosdynamic limits to engine performance; heat losses and power at the piston; mechanical losses and power at the flywheel; induction motors and their principle of operation; single phase and three phase induction motors; variable speed electric motors and their efficiency; introduction to v-belt and chain drives; mechatronics and system control; sensors, types, and applications in agriculture; GPS and applications in agriculture; GIS and applications; global area networks.

UNIT IV Internet of Things

Introduction to IoT: emergence, Internet of everything, industrial IoT, smartness in IoT; IoT architecture: SOA based and API oriented; resource management; IoT data management; communication protocols: network , transport, application layers; IoT applications; security, privacy, and standardization of IoTs; fog computing, architectures, and applications; IoT robustness and reliability; TinyTO: two way authentication for constraint devices in IoT.

M. Sc. Electronics
2nd Semester (NEP 2020)
(for the examinations to be held in the years 2027, 2028 and 2029)
Course No: P1ELTC201

References

1. John G. Webster, Medical instrumentation: application and design, John Wiley & Sons, Inc, New York.
2. R. S. Khandpur, Handbook of biomedical instrumentation, Tata McGraw-Hill Publishing Company Limited., New Delhi.
3. Ajit K Srivastava, Carroll E Goering, Roger P Rohrbach, Dennis R Buckmaster, Engineering principles of agriculture machines, ASAE publication
4. Rajkumar Buyya and Amir Vahid Dastjerdi, Internet of things: principles and paradigms, Elsevier

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II**. Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
2nd Semester (NEP 2020)
(for the examinations to be held in the years 2027, 2028 and 2029)
Course No: P1ELTC202

Course No: P1ELTC202 (Core Course)
Title: **Data Communication**
Credits: 4
Test I & Test II: 40 Marks
Validity: May 2027, 2028 and 2029 Exams

Duration of Examination: 2.5 Hours
Max. Marks: 100
Major Test: 60 Marks

Course Objectives
To equip the students with the principles of Data communication systems.

Course Outcomes
At the end of the course the students should be able to

- Understand different Network topologies.
- Describe the principles of wireless and mobile communication.
- Understand the principle and techniques of optical communication.
- Describe the satellite communication techniques and radar principle.

Unit I Network Technologies
Network hardware: Topologies, switching: circuit, packet and message, routers and routing, network OSI model, LAN, WAN, MAN, wireless network, GSM, short messaging in GSM, ARPANET, INTERNET; protocols: one bit sliding window, HDLC, ALOHA, CSMA, TCP/IP, UDP, ISDN.

Unit II Wireless and Mobile Communication
Introduction: Overview, challenges in wireless networks, wireless network standards; Modern wireless communication systems: 2G, 3G & 4G. Introduction to mobile communication, main methods of radio transmission, GSM standards for cellular telephony, Architecture of GSM, Cellular mobile radio systems, Structure & working of cell phone, Performance criteria for cellular phones, operation of cellular systems, Concept of frequency re-use, power control for cellular systems, Function of MTSO & interconnection.

Unit III Optical Communication
Introduction to optical fibers, comparison of optical fiber with other interconnectors, attenuation in fibers, splices and connector optical fiber communication systems (analog and digital), opto-electronics Ics, Opto-coupler, OEIC-Transmitter/Receiver. Propagation in fibers, Step Index, Graded Index, Multipath dispersion, Material dispersion, combined effect.

Unit IV Satellite Communication and Radar
Introduction: satellite frequency bands, satellite system; satellite orbits: inclined, polar and equatorial, geostationary satellite; satellite channel: electromagnetic field propagation, transmission path and path loss, saturation flux density, satellite link analysis; satellite earth station, satellite transponder. Radar fundamental: block diagram, radar range equation, performance factor, detection of signal in noise; Doppler effect, MTI and pulse Doppler radar.

M. Sc. Electronics
2nd Semester (NEP 2020)
(for the examinations to be held in the years 2027, 2028 and 2029)
Course No: P1ELTC202

References

1. Andrew S.Tanenbaum, Computer networks, Prentice Hall of India Limited, New Delhi.
2. Kavesh Pahlavan, Principles of Wireless Networks, Pearson Education
3. Achyut S Godbole, Data Communication and Networks, Tata McGraw-Hill
4. Sudhir K. Pandey, Handbook of satellite communication, Authors Press, New Delhi.
5. Tri T. Ha, Digital satellite communications, McGraw-Hill Publishing Company, New York.
6. John Gowar, Optical communication systems, Prentice-Hall of India Limited, New Delhi.
7. Merrill I. Skolnik, Radar Communication Systems, Mc Graw Hill Education.
8. R.G. Hunsperger, Integrated Optics: Theory & Technology (3rd edition)
9. J. Wilson, J.F.B. Hawkes, Optoelectronics: An Introduction (2nd edition)
10. Goving P. Aggarwal, Fiber Optic Communication Systems
11. John M. Senior, Optical Fiber Communications – Principle & Practice
12. Theodore S Rappaport, Wireless communications, Pearson.
13. Jon W Mark and Weihua Zhuang, Wireless communications and Networking, PHI.
14. R.P. Singh and S.D. Sapre, Communication Systems, Tata McGraw-Hill.

Scheme of Examination

The student shall be continuously evaluated during the conduct of each course on the basis of his/her performance as follows:

MCQ on LMS + Subjective Test	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
TEST I (after 30 days)	25%	1 hour	10 + 10
TEST II (after 60days)	26 to 50%	1 hour	10 + 10
Theory	Syllabus to be covered in the examination	Time allotted for the examination	%Weightage (Marks)
Major test (after 90 days)	100%	2.5 hours	60
Total			100

Test I and Test II

The Subjective Test of Test I and Test II would consist of three short answer type questions (05 marks each). Students are required to answer two questions. **No preparatory holidays shall be provided for the Test I and Test II.** Those candidates who have appeared in Test I and Test II and failed to get the minimum required marks i.e. 14 out of 40 will be eligible to re-appear in the Test I and Test II only once.

Major Test

The Major test will comprise of two sections, Section-A and Section-B. Section-A will have one compulsory question comprising of 10 parts (minimum 02 from each unit) of 03 marks each. Section B will have 04 questions of 15 marks each to be set from the last two units (02 from each unit). Students are required to attempt 01 question from each unit of section B. **In major test there should not be a gap of more than two days in between two tests.**

M. Sc. Electronics
2nd Semester (NEP 2020)
(for the examinations to be held in the years 2027, 2028 and 2029)
Course No: P1ELRC203

Course No: P1ELRC203 (Core Course)
Credits: 16
Sessional Assessment: 200
Validity: May 2027, 2028 and 2029 Exams

Title: **Research**
Max. Marks: 400
Semester Exam: 200

Course Objectives

This course aims to motivate the students to take up relevant industrial problems as a major project so as to incorporate better practical skills, research capabilities and problem-solving abilities in them. This includes applying theoretical knowledge to design and build electronic systems, conducting research and understanding the latest trends in the field.

Course Outcomes

- This course will equip students with practical skills, enhance problem-solving abilities and foster research-based learning.
- Students will develop the ability to apply theoretical knowledge to real world problems besides analyzing, designing and implementing solutions.
- Students will gain experience in teamwork, communication and project management.

Course Scheme

The students are required to undertake a major project on topics falling in the Electronics domain under the supervision of a faculty member from the department. The candidates are required to demonstrate the project undertaken by them in the form of a prototype and should be implemented using the hardware/software. The candidates will be further required to present a seminar based on the project work carried out by them.

Scheme of Examination

<table>
<tr><th>Examination</th><th>Duration of examination</th><th colspan="3">%Weightage (Marks)</th></tr>
<tr><td>Internal Examination</td><td>3 hours</td><td colspan="3">50% (200)
Regularity/Attendance = 50, Dissertation = 50, Seminar & Viva-Voce = 100</td></tr>
<tr><td rowspan="2">External Examination</td><td rowspan="2">3 hours</td><td rowspan="2">50% (200)</td><td>Dissertation</td><td>50</td></tr>
<tr><td>Viva-Voce</td><td>150</td></tr>
<tr><td colspan="2">Total</td><td colspan="3">400</td></tr>
</table>

Internal and External Examination

The students shall be examined internally by Board of Examiners consisting of Head of the Department and other faculty members.
External Practical examination shall be conducted by Board of Examiners consisting of Head of the Department, one/two Senior Professors of concerned department, concerned teacher and outside expert to be appointed by the Vice-Chancellor out of the panel to be provided by the Head of the Department who shall evaluate/assess final practical performance/ dissertation of the students.