3rd SEM SYLLABUS

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

3RD SEMESTER SYLLABUS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE301	Network Analysis	3	1	0	4
2.	ECE302	Basic Electronics	3	1	0	4
3.	ECE303	Signals and Systems	3	1	0	4
4.	ELE301	Principles of Electrical Engineering	3	1	0	4
5.	MET303	Electronics Engineering Materials	2	1	0	4
6.	MTH306	Mathematics-III	2	1	0	3
7.	ECE304P	Electronic Circuits-I LAB	0	0	2	1
8.	ELE302P	Principles of Electrical Engineering LAB	0	0	2	1
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-301** **Course Title** **Network Analysis [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To introduce students with the basic concepts of Electric Circuit theory and familiarize them how to analyze the circuits to get transits as well as steady state response of the system with emphasis on analysis in frequency domain using various techniques.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Development of the circuit Concept:** Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts, approximate realization of a physical system as a circuit.
2.	**Conventions for describing networks:** Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology, KVL and KCL equations, Source transformation, Dual networks.
3.	**First order differential equation:** Differential equations as applied in solving networks, Application of initial conditions, evaluating initial conditions in networks.
4.	**Laplace Transformations:** Solution of Network problems with Laplace transformation, Heavisides expansion theorem.
5.	**Wave form analysis and synthesis:** The unit step, ramp and impulse functions and their Laplace transforms, Initial and final value theorems, convolution integral, convolution as summation.
6.	**Network theorems and impedance functions:** Complex frequency, transform impedance and transform circuits, series and parallel combinations of elements, Fosters reactance theorem and reciprocity theorem.
7.	**Network Functions- Poles and Zeros**: Ports or terminal pairs, Network functions for one port and two port networks (ladder and general networks), Poles and Zeros of network functions, Restriction on pole and zero locations for driving point and transfer functions. Time domain behaviour from pole zero plot.
8.	**Two port parameters:** Relationship of two port parameters, Admittance, impedance, transmission and hybrid parameters, Relationship between parameter sets, Parallel connection of two port Networks, Characteristics impedance of two port networks.
9.	**Filters** : Filter fundamentals – pass and stop band, filter classification, constant K & m derived filters, Behaviour of characteristic impedance over pass & stop bands, design of filters.

10. Suggested Books

1.	**Network Analysis**	**M.E. Van Valkenberg**
2.	**Network Analysis and Synthesis**	**F. F. Kuo**
3.	**Network Analysis and Synthesis**	**K.M. Soni**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-302 Course Title Basic Electronics [ECE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To familiarize with the basic semiconductor materials and to know about the working and performance of devices like BJTs and FETs.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Semiconductors:** Intrinsic and extrinsic semiconductors transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications.
2.	**P-N junction diode Current components in p-n junction,** Characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schottky photo and tunnel diodes.
3.	**BJT's Types operation and characteristics,** Ebers-Moll model, CE, CB and CC configuration input, output characteristics and graphical analysis of basic amplifier circuits, Biasing and Bias stability, Low frequency, h-parameter model, Analysis and Design of transistor amplifier circuits using h-parameters. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies. Multistage amplifiers, phototransistors, Transistor as a switch, SCR's and Thyistors.
4.	**FET's Operation and characteristics,** model Application at low and high frequency, amplifiers, switching circuits, MOSFET TYPES, Operation and characteristics.
5.	**Introduction to IGBT.**

10. Suggested Books

1.	**Integrated Electronics**	**J. Millman, C. Halkias, & Chetan D Parikh**
2.	**Microelectronics**	**Sedra & Smith**
3.	**Electronic Circuits**	**D. Schelling & Belove**
4.	**Electronic Devices & Circuits**	**R. Boylestad**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-303** **Course Title** **Signals and Systems [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To acquire knowledge and become familiar with various types of signals, their use in various types of systems with emphasis in time domain.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Signals & Systems:** Definition of a signal & System, Classification of Signals, Basic operations on Signals, Elementary Signals, Systems viewed as interconnection of operations, Properties of Systems, Sampling theorem, Graphical & Analytical proof of Band-limited signals, Impulse Sampling, Aliasing
2.	**Linear Time Invariant (LTI) Systems:** Time-Domain representation & Characterization of LTI systems, Impulse response representation, Convolution integral & Convolution sum, properties of LTI systems, Stability criteria for LTI systems, Elements of Continuous time & Discrete-time LTI systems.
3.	**Fourier Representation of Signals:** Fourier representation of Signals, Continuous -time Fourier series and their properties, Application of Fourier series to LTI systems, Fourier Transform & its properties, Applications of Fourier Transform to LTI systems, Discrete-time Fourier Transform & its properties. Circular Convolution, Relationship to other transforms.
4.	**Laplace Transform:** Introduction & Definition, Region-of- convergence, Properties of Laplace transform, Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations, Analysis of Electric circuits.
5.	**Z-Transform:** The Z-Transform, Region-of-convergence, properties of Z-Transform, Inverse Z-Transform, Transform Analysis of Discrete-time LTI systems, Unilateral Z-Transform & its applications to LTI systems described by difference equations.

10. Suggested Books

1.	**Signals & Systems**	**Haykins**
2.	**Signals & Systems**	**Ziemer**
3.	**Signals & Systems**	**Sanjay Sharma**
4.	**Signals Analysis**	**A Papoulis**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ELE-301 Course Title Principles of Electrical Engg

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To acquire knowledge and become familiar with the different techniques to solve the different complex Electrical, Electronics Circuits.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Electric Circuit Laws:** Basic electric circuit terminology, Ohm's law, Kirchhoff's current law. (KCL) and Kirchhoff's voltage law (KVL) circuit parameters (Resistance, Inductance and capacitance). Series and Parallel combinations of resistance, Inductance and capacitance, Nodal analysis.
2.	**Energy Source:** Ideal and practical voltage and current sources and their transformation.
3.	**Dependent Sources:** Dependent voltage sources and dependent current sources
4.	**D.C. Circuit Analysis:** Power and energy relations, Analysis of series parallel d.c. circuits, Delta star (Y) Transformation, Loop and Nodal methods, Thevenin's, Norton's theorem, Maximum Power transfer theorem, Superposition theorem.
5.	**A.C. Circuit Analysis:** Basic terminology and definitions, Phasor and complex number representations, solutions of sinusoidal excited, RC circuits, power and energy relations in a c circuits, Applications of network theorems to a.c. circuits, Resonance in series and parallel circuits.
6.	**Steady State A.C. Three phase Circuits:** Concept of a 3 phase voltage, wye (Y) circuits. Delta circuits, current and voltage relations in Y and delta Circuits, characteristics of 3 phase systems**.**
7.	**Magnetically Coupled Circuits:** Mutual inductance, Theory of magnetic circuits and electromagnetism. Transformers.

10. Suggested Books

1.	**Electrical Engg. Principles**	**Vincent Deltoro**
2.	**Principles of Electrical Engg**	**B. C. Theraja**
3.	**Fundamentals of Electric Circuits**	**Alexander Sadeker**
4.	**Basic Engineering Circuit Analysis**	**Irwin**
5.	**Electric Circuits Fundamentals**	**Franco**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **MET 303** **Course Title** **Electronic Engineering Materials**

2 Contact Hours	**L**	**2**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**4**

3rd Sem	●	
	Autumn	**Spring**

6. Objective **To familiarize with the basic principles related to the physics of materials relevant to electrical, electronic, magnetic and optical properties.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Crystal Structure:** Crystalline state, bravais lattices, Miller indices, reciprocal lattice, common crystal structures, interference phenomenon, Bragg's diffraction, crystal imperfections.
2.	**Free electron theory:** conduction in metals and alloys, conductors and resistors.
3.	Growth of single crystals, zone refining technique.
4.	**Semiconductors:** their properties and applications.
5.	**Magnetism:** Magnetic properties of materials, diamagnetism, para-magnetism, ferromagnetism, black well, domain dimensions, anti-ferromagnetism, and ferromagnetism, ferrites, Magnetic Materials: Fe, Si, Ni, Co, Hard magnetic materials.
6.	**Dielectric materials:** Electric & optical properties, polarization in static and alternating field, piezoelectricity, polarizability and dielectric constant, optical transition in solids, absorption and emission of radiation.
7.	Materials for resistors, capacitors and inductors, properties and application of plastic materials.
8.	Superconductivity and superconductors.

10. Suggested Books

1.	**Introduction to Solid State physics**	**Kittle**
2.	**Solid state Physics**	**Dekker**
3.	**Physical Met. Principles**	**Reedhill**
4.	**Material Science and Engineering**	**Raghavan**
5.	**Electronic Processes in Materials**	**Azaroff.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **MTH 306** **Course Title** **Mathematics-III**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

3rd Sem	●	
	Autumn	Spring

6. Objective **To understand various transformation techniques and their use to solve boundary value problems, and various linear differential equations.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 38.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Laplace Transforms:** Laplace Transform, Shifting Theorem, Laplace transforms of different functions, Heaviside's Unit function, Dirac Delta Function its Laplace transforms. Heavisides Expansion Theorem, Inverse Laplace Transforms. Initial and final value theorems, Convolution theorem and Applications, Use of Laplace Transforms in the solution of linear Differential equations.
2.	**Fourier transform:** Fourier Series, Harmonic Analysis, Definition of Fourier Transform, Fourier sine and cosine transform, Fourier integral Formula. Applications to solutions of boundary value problems.
3.	**Z- Transform:** Definition, Linearity property, Z- Transform of elementary functions, Shifting Theorems. Initial and final value Theorem, Convolution theorem, inversion of Z-transforms.

10. Suggested Books

1.	**Laplace Transforms (Schaum Series)**	**Murray R. Speigal**
2.	**The use of Integral Transform**	**Ian.N.Snedden**
3.	**Integral Transform**	**Loknath Debnath**
4.	**Advanced Engineering Mathematics**	**R.K. Jain & S.R.K. Lyengar**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-304P **Course Title** Electronic Circuits–I LAB [ECE]

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

3rd Sem	●	
	Autumn	Spring

6. Objective To acquire knowledge and become familiar with the different techniques to analyze, synthesize various networks to get particular outputs desired.

7. Pre-requisite Nil

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	Study of CRO - Measurement of Voltage frequency and Phase of a given waveform
2.	To assemble RC circuits and observe its performance in low pass and high pass mode.
3.	To assemble a series and parallel resonant circuit and observe their frequency response.
4.	To measure impedance and bandwidth of a parallel tuned circuit and obtain its quality factor.
5.	To measure image & characteristic impedance of a symmetrical Tee and Pi networks.
6.	For a given two port network measure: i) ABCD parameters. ii) h – parameters
7.	To experimentally determine the characteristic impedance and to plot the attenuation characteristics of the following circuits. i) Prototype low pass filter. ii) Prototype high pass filter. iii) Prototype band-pass filter. iv) m-derived LPF. v) m-derived HPF
8.	To obtain diode characteristics
9.	a) To assemble a half wave and a full wave rectifier and to study their performance. b) To suppress the ripple using RC filter.
10.	To obtain Zener diode characteristics and to use Zener diode as a voltage regulator
11.	To assemble and observe the performance of clipping and clamping circuits.
12.	To obtain transistor characteristics in the following configurations: i) Common base. ii) Common emitter
13.	To assemble a CE amplifier and observe its performance.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-302P **Course Title** Principles of Electrical Engg. LAB

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

3rd Sem	●	
	Autumn	Spring

6. Objective To acquire knowledge and become familiar with the different techniques to solve the different complex Electrical, Electronics Circuits.

7. Pre-requisite Nil

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	To study the colour coding of resistors
2.	Connection of Ammeters, Voltmeters, Wattmeters and multi-meters in DC and AC circuits and selection of their ranges
3.	Use of LCRQ meter.
4.	To study the series / parallel operation of resistors and verifying their effective values by LCRQ meter.
5.	To verify the KVL and KCL in DC circuits.
6.	To verify the star delta transformation of networks.
7.	To verify the superposition theorem.
8.	To verify the maximum power transfer theorem
9.	Basic R, L, C circuits excited from A.C
10.	To measure electric power in single-phase AC circuits with resistive load, RL load and RLC load.
11.	To measure the power and power factor in three phase AC circuits.
12.	To study the series resonance.
13.	To study the parallel resonance.
14.	To study the handling of CRO and use it for the study of different voltage waveforms.
15.	Computer Aided Circuit Analysis (3 experiments)

SYLLABUS OF SUBJECTS TAUGHT TO OTHER DEPARTMENTS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
	INFORMATION TECHNOLOGY ENGINEERING					
1.	ECE-305	Electronic Devices & Circuits [IT]	3	1	0	4
2.	ECE-306P	Electronic Circuits–I LAB [IT]	0	0	2	1
	COMPUTER SCIENCE ENGINERRING					
1.	ECE-305	Electronic Devices & Circuits [CSE]	3	1	0	4
2.	ECE-306P	Electronic Circuits–I LAB [CSE]	0	0	2	1
	ELECTRICAL ENGINEERING					
1.	ECE-301	Network Analysis [ELE]	3	1	0	4
2.	ECE-302	Electronics- I [ELE]	3	1	0	3
3.	ECE-302P	Electronic Circuits–I LAB [ELE]	0	0	2	1

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-305** **Course Title** **Electronic Devices & Circuits [IT]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To familiarize with the basic semiconductor materials and to know about the working and performance of devices like BJTs and FETs.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Semiconductors:** Intrinsic and extrinsic semiconductors transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications, p-n junction diode. Current components in p-n junction, characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schottky photo and tunnel diodes
2.	**BJT's:** Types operation and characteristics, Ebers-Moll model, CE, CB and CC configuration input, output characteristics and graphical analysis of basic amplifier circuits, Biasing and Bias stability, Low frequency, h-parameter model, Analysis and Design of transistor amplifier circuits using h parameters. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies. Multistage amplifiers, phototransistors, Transistor as a switch, SCR's and Thyistors.
3.	**FET's:** Operation and characteristics, model Application at low and high frequency, amplifiers, switching circuits, MOSFEET TYPES, Operation and characteristics. Cathode Ray Cathode Ray Oscilloscope Basic operation and measurement applications.

10. Suggested Books

1.	Electronic circuits	D Schelling & C Belove
2.	Integrated Electronics	Millman & Halkias
3.	Basic Electronics	Grob
4.	Basic Electronics	Mitehel E Schultz TMH

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-306P** **Course Title** **Electronic Circuits–I LAB [IT]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

3rd Sem	●	
	Autumn	Spring

6. Objective **To acquire knowledge and become familiar with the different techniques to analyze, synthesize various networks to get desired output.**

7. Pre-requisite **Nil**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	Study of CRO - Measurement of Voltage frequency and Phase of a given waveform
2.	To obtain diode characteristics.
3.	a) To assemble a half wave and a full wave rectifier and to study their performance. (b) To suppress the ripple using RC filter.
4.	To obtain Zener diode characteristics and to use Zener diode as a voltage regulator.
5.	To assemble and observe the performance of clipping and clamping ckts.
6.	To obtain transistor characteristics in the following configurations. i) Common base ii) Common emitter
7.	To assemble a CE amplifier and observe its performance.
8.	To obtain frequency response of a RC coupled CE amplifier.
9.	To assemble an emitter follower circuits and observe its performance.
10.	To obtain JFET characteristics and to observe performance of a source follower.
11.	To illustrate use of FET as a voltage variable resistor.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-305 Course Title Electronic Devices & Circuits [CSE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To familiarize with the basic semiconductor materials and to know about the working and performance of devices like BJTs and FETs.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Semiconductors:** Intrinsic and extrinsic semiconductors transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications, p-n junction diode. Current components in p-n junction, characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schottky photo and tunnel diodes
2.	**BJT's:** Types operation and characteristics, Ebers-Moll model, CE, CB and CC configuration input, output characteristics and graphical analysis of basic amplifier circuits, Biasing and Bias stability, Low frequency, h-parameter model, Analysis and Design of transistor amplifier circuits using h parameters. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies. Multistage amplifiers, phototransistors, Transistor as a switch, SCR's and Thyistors.
3.	**FET's:** Operation and characteristics, model Application at low and high frequency, amplifiers, switching circuits, MOSFEET TYPES, Operation and characteristics. Cathode Ray Cathode Ray Oscilloscope Basic operation and measurement applications.

10. Suggested Books

1.	**Electronic circuits**	**D Schelling & C Belove**
2.	**Integrated Electronics**	**Millman & Halkias**
3.	**Basic Electronics**	**Grob**
4.	**Basic Electronics**	**Mitehel E Schultz TMH**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-306P **Course Title** Electronic Circuits–I LAB [CSE]

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

3rd Sem	●	
	Autumn	Spring

6. Objective To acquire knowledge and become familiar with the different techniques to analyze, synthesize various networks to get desired output.

7. Pre-requisite Nil

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	Study of CRO - Measurement of Voltage frequency and Phase of a given waveform
2.	To obtain diode characteristics.
3.	a) To assemble a half wave and a full wave rectifier and to study their performance. (b) To suppress the ripple using RC filter.
4.	To obtain Zener diode characteristics and to use Zener diode as a voltage regulator.
5.	To assemble and observe the performance of clipping and clamping ckts.
6.	To obtain transistor characteristics in the following configurations. i) Common base ii) Common emitter
7.	To assemble a CE amplifier and observe its performance.
8.	To obtain frequency response of a RC coupled CE amplifier.
9.	To assemble an emitter follower circuits and observe its performance.
10.	To obtain JFET characteristics and to observe performance of a source follower.
11.	To illustrate use of FET as a voltage variable resistor.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-301** **Course Title** **Network Analysis [ELE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To introduce students with the basic concepts of Electric Circuit theory and familiarize them how to analyze the circuits to get transits as well as steady state response of the system with emphasis on analysis in frequency domain using various techniques.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Development of the circuit Concept:** Charge and energy, capacitance, inductance and resistance parameters in the light of field and circuit concepts, approximate realization of a physical system as a circuit.
2.	**Conventions for describing networks:** Reference directions for currents and voltages, conventions for magnetically coupled circuits, Circuit topology, KVL and KCL equations, Source transformation, Dual networks.
3.	**First order differential equation:** Differential equations as applied in solving networks, Application of initial conditions, evaluating initial conditions in networks.
4.	**Laplace Transformations:** Solution of Network problems with Laplace transformation, Heavisides expansion theorem.
5.	**Wave form analysis and synthesis:** The unit step, ramp and impulse functions and their Laplace transforms, Initial and final value theorems, convolution integral, convolution as summation.
6.	**Network theorems and impedance functions:** Complex frequency, transform impedance and transform circuits, series and parallel combinations of elements, Fosters reactance theorem and reciprocity theorem.
7.	**Network Functions- Poles and Zeros**: Ports or terminal pairs, Network functions for one port and two port networks (ladder and general networks), Poles and Zeros of network functions, Restriction on pole and zero locations for driving point and transfer functions. Time domain behaviour from pole zero plot.
8.	**Two port parameters:** Relationship of two port parameters, Admittance, impedance, transmission and hybrid parameters, Relationship between parameter sets, Parallel connection of two port Networks, Characteristics impedance of two port networks.
9.	**Filters** : Filter fundamentals – pass and stop band, filter classification, constant K & m derived filters, Behaviour of characteristic impedance over pass & stop bands, design of filters.

10. Suggested Books

1.	**Network Analysis**	**M.E. Van Valkenberg**
2.	**Network Analysis and Synthesis**	**F. F. Kuo**
3.	**Network Analysis and Synthesis**	**K.M.Soni**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-302 **Course Title** Electronics- I [ELE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

3rd Sem	●	
	Autumn	Spring

6. Objective **To familiarize with the basic semiconductor materials and to know about the working and performance of devices like BJTs and FETs.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Semiconductors:** p and n types, transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications
2.	**P-N junction diode:** Current components in p-n junction, Characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schottky photo and tunnel diodes.
3.	**UJT's & BJT's:** Types, operation and characteristics, Ebers- Moll model, CE, CB and CC configurations- input, output characteristics and graphical analysis of basic amplifier circuits, biasing and Bias stability, Low frequency, h- parameter model, Analysis and Design of transistor amplifier circuits using h parameters. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies, Multistage amplifiers, Phototransistors. Transistor as a switch. SCR's and Thyristors.
4.	**JFET's:** Operation and characteristics, models, application as low and high frequency amplifiers, switching circuits, MOSFETS -–types, operation and characteristics
5.	**Cathode- ray Oscilloscope :** basic operation and measurement, applications

10. Suggested Books

1.	**Integrated Electronics**	**J. Millman, C. Halkias, & Chetan D Parikh**
2.	**Microelectronics**	**Sedra & Smith**
3.	**Electronic Circuits**	**D. Schelling & Belove**
4.	**Electronic Devices & Circuits**	**R. Boylestad**
5.	**Electronic Devices & Circuits**	**Bogarat**
6.	**Electronic Devices & Circuits**	**Godsi & Bakhshi**

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NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-302P** **Course Title** **Electronic Circuits–I LAB [ELE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

3rd Sem	●	
	Autumn	Spring

6. Objective **To introduce students with the basic concepts of electronic devices, their working, performance and to know there use.**

7. Pre-requisite **Nil**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	Study of CRO - Measurement of Voltage frequency and Phase of a given waveform
2.	To obtain diode characteristics.
3.	a) To assemble a half wave and a full wave rectifier and to study their performance. (b) To suppress the ripple using RC filter.
4.	To obtain Zener diode characteristics and to use Zener diode as a voltage regulator.
5.	To assemble and observe the performance of clipping and clamping ckts.
6.	To obtain transistor characteristics in the following configurations. i) Common base ii) Common emitter
7.	To assemble a CE amplifier and observe its performance.
8.	To obtain frequency response of a RC coupled CE amplifier.
9.	To assemble an emitter follower circuits and observe its performance.
10.	To obtain JFET characteristics and to observe performance of a source follower.
11.	To illustrate use of FET as a voltage variable resistor.

4th SEM SYLLABUS

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

4th SEMESTER SYLLABUS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE401	Analog Electronics	3	1	0	4
2.	ECE402	Communications Systems-I	3	1	0	4
3.	ECE403	Digital Electronics and Logic Design	3	1	0	4
4.	ELE406	Electrical Machines	2	0	2	3
5.	ELE407	Control System	2	1	0	3
6.	MTH403	Mathematics-IV	2	1	0	3
7.	ECE404P	Electronic Circuits-II LAB	0	0	2	1
8.	ECE405P	Communications Systems-I LAB	0	0	2	1
9.	ECE406P	Digital Electronics and Logic Design LAB	0	0	2	1
10.	ELE408P	Control System LAB	0	0	2	1
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-401** **Course Title** **Analog Electronics [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

4th Sem		●
	Autumn	Spring

6. Objective **To make students aware about the effects of feedback in electronic amplifiers,to analyse the amplifiers under different feedback config.,to design various sinusoidal oscillators,to understand op amp basics and its application in electronics,to design various wave shaping circuits,to understand power amplifiers and desin power supplies.**

7. Pre-requisite **Students should be familiar with basic electronics.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Feedback Basics :** Negative feedback, Effect of negative feedback on the performance of amplifiers e.g. on bandwidth. Types of feedback amplifiers, current shunt, current series, voltage shunt, and voltage series feedback. Analysis of feedback amplifiers circuits.
2.	**Sinusoidal Oscillators:** Basic operations, analysis of general oscillator circuit, Barkhausen's criteria, various types of oscillator circuits and their analysis, Design of practical oscillator circuits.
3.	**Power Amplifiers and Power Supplies** Classification of power amplifiers, Class A, Class B, Class AB and Class C power amplifiers; analysis and design. Power supplies and IC regulators.
4.	**Operational Amplifiers:** Operational amplifiers stages, Differential amplifier, CMRR, Cascade amplifier, Ideal and practical operational amplifier characteristics and properties OP amp applications, inverting and non inverting amplifiers, difference amplifier, summer differentiator and integrator, rectifiers etc. OP-AMP in analog computation. Frequency response, Gain Bandwidth product, Signal to noise ratio.
5.	**Multivibrators and Wave Form Generator**s Bi-stable, Monostable and astable multivibrator circuits, and their analysis. Wave form generators, triangular and square wave generators.
6.	**Logic families:** Introduction to DTL, TTL, ECL, RTL CMOS Logic family; CMOS, Pseudo-nMOS, Pass Transistor. CMOS inverter Static and dynamic operation, common CMOS Logic Gate circuits.

10. Suggested Books

1.	**Integrated circuits**	**Millman & Halkias**
2.	**Microelectronic circuits**	**Sedra and Smith**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-402** **Course Title** **Communication System-I [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

4th Sem		
	Autumn	Spring

6. Objective **To analyse various analog modulation & demodulation schemes, to understand operation of AM & FM radio receivers, to perform noise analysis of AM & FM systems,to understand baseband & broadband digital modulation schemes.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Modulation**: AM, DSB/SC, SSB, VSB, Angle modulation, NBFM, WBFM, Diode detector, Frequency discriminator, AM & FM, Transmitter.
2.	**Demodulation**: AM and FM signals Radio Receivers – AM & FM (Block diagram)
3.	**Noise Analysis**: Performance of AM & FM Systems, in presence of noise Threshold in AM & FM, Demodulation, pre emphasis and De emphasis, in FM Systems.
4.	**Digital Communication**: Sampling, Quantization, quantization noise, Coding, Pulse code Modulation; differential PCM, ADPCM, Relative advantages and dis-advantages. Delta modulation, PWM & PPM.
5.	**Digital Modulation Techniques**: Binary transmission systems: Applications and types ASK,FSK,PSK, M-FSK DPSK, QPSK,QAM Schemes
6.	**Signal constellation.**

10. Suggested Books

1.	**Principles of Communication Systems**	**Taub & schling**
2.	**Communication systems**	**Simon Haykins**
3.	**Electronic Communication Systems**	**G. Kennedy**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-403** **Course Title** **Digital Electronics & Logic Design[ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

4th Sem		
	Autumn	Spring

6. Objective **To study number systems, simplification and implementation of digital functions, design & analysis of various combinational and sequential circuits, memory organization & its types and also understand basics of VHDL prog.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	Review of Binary, octal and hexadecimal number systems. Various types of codes
2.	Boolean algebra and Boolean theorems.
3.	Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence.
4.	Simplification techniques and minimization by map methods. Tabular method.
5.	Combination logic and arithmetic circuits. Encoders and Decoders, Multiplexes and De multiplexes.
6.	Sequential circuits – state diagrams and state tables, design and analysis of flip flops, registers, counters, Synchronous and Asynchronous operation of sequential circuits. Analog to Digital converter, Digital to Analog converter.
7.	Latches and memory organizations. ROM's, EPROM's and RAM's Dynamic and Static.
8.	Introduction to PLA's
9.	IEEE notations.
10.	VHDL Programming: Introduction, Code structure, Data Types Operators, & Attributes, Concurrent Code, Sequential Code, Signals &Variables, State Machines, Circuit Designs. Mathematical principles, significant figures and rounding off. Graphical and numerical methods of data fitting. Solutions of equations by trial and error, and interaction techniques.

10. Suggested Books

1.	**Digital Logic & Computer Design**	**M Morris Mano**
2.	**Digital Electronics**	**Gupta & Singhal**
3.	**Digital principles and applications**	**A. P. Malvino**
4.	**Switching Circuits**	**Marcus**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ELE406** **Course Title** **Electrical Machines [ECE]**

2 Contact Hours

L	2	T	0	P	2

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

4^{th} Sem		●
	Autumn	Spring

6. Objective **The objective of the course is to describe the operating principles, characteristics &applications of transformers and rotating electric machines (DC motors and generators).**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Transformers:** Operating principle, classification, construction, emf equation, phasor diagrams, equivalent circuit model, losses & efficiency, voltage regulation, frequency response, polarity test, autotransformers, three-phase transformer connections, impedance matching, isolation & instrument transformers.
2.	**D.C. Machines:** Operating principle, generator & motor action, construction, types of excitation, emf & torque equations, power stages & efficiency. Commutation & Armature Reaction, characteristics & application of d.c generators, starting & speed control of d.c motors, characteristics & applications of d.c motors, electric braking.
3.	**Induction Machines:** Three-phase induction motors. Principle of operation, construction, types. Rotating magnetic field, emf equation of an AC Machine, torque developed in an induction motor, equivalent circuit model, torque-speed characteristics, starting & speed control. Single phase induction motors, starting, application
4.	**Synchronous Machines:** Construction, types & operating principle of synchronous generator, A.C armature windings, equivalent circuit, phasor diagrams, voltage regulation, parallel operation, synchronization, Power Angle characteristics, effect of field excitation change. Synchronous Motor, principle, starting, hunting, damper windings
5.	**Special Purpose Motors:** Stepper Motor, Universal Motor, Shaded-pole Motor

10. Suggested Books

	Electric Machinery	**Fitzgerald, Kingslay, Umans**
2.	**Electric Machinery Fundamentals**	**Chapman**
3.	**Electric Machines**	**Nagrath and Kothari**
4.	**Electric Machinery and Transformer**	**Guru, Hiziroglu**
5.	**Electric Machinery**	**P.S.Bimbhra**
6.	**Basic Electric Machines**	**Vincent Deltoro**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ELE407** **Course Title** **Control System [ECE]**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

4th Sem		
	Autumn	Spring

6. Objective **The objective of the course is to introduce the students to modeling, analysis and design of control systems which are an integral part of modern society and have widespread application in science and industry.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **35~ 40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to linear Control System:** Control Systems, types of control systems, feedback and its effects, mathematical modeling of physical systems.
2.	**System Representations:** Block diagrams, transfer functions, signal flow graphs, polar and Bode plot representation of loop gains of control systems.
3.	Time Domain Analysis of Control Systems
4.	Typical test signals for time response of control systems, time domain performance of first and second order control systems (steady state response and transient response), P I D Controllers.
5.	**Stability of Control Systems:** Stability characteristic equation, state transition matrix, stability of linear time invariant systems, Rough-Hurwitz Criterion, Nyquist criterion, Root locus plot, Bode diagrams
6.	**Frequency Domain Analysis of Control Systems:** Frequency domain characteristics second order systems relative stability, graphic methods of determining gain margin and phase margin, Nichols chart
7.	**Introduction to Modern Control Theory:** State Equations, State Transition Matrix, State transition equations, State Diagrams, concept of controllability and observability

10. Suggested Books

1.	**Modern Control Engineering**	**K. Ogatta**
2.	**Automatic Control Systems**	**B. C. Kuo**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **MTH 403** **Course Title** **Mathematics-IV**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

4th Sem		
	Autumn	Spring

6. Objective **To understand various transformation techniques and their use to solve boundary value problems, and various linear differential equations.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 38.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Statistics and probability:** Measures of Central tendency and Measures of Variations (Dispersions), Moments, Measures of skewness and kurtosis. Random experiment, sample space, Events, Classical statistical and Axiomatic Definitions of Probability. Statements and proof of theorems on addition and multiplication of probabilities. Simple problems. Baye's theorem on conditional probability. Random Variables, Derivation of formulae for mean, Variance and moments of random variables for discrete and continuous cases. Laws of expectation, Binomial, Poisson and normal Distributions, Beta and gamma Distribution, t-distribution, F-Distribution, Chi-square Distribution and their applications. Methods of least squares, fitting a straight line and parabola of Degree 'p'. Regression and correlation. Multiple and partial correlation..

10. Suggested Books

1.	**Mathematical Statistics**	**J. H. Kapur & Sexana**
2.	**Introduction to mathematical Statistics**	**P. E. Walpole**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-404P** **Course Title** **Electronic Circuits–II LAB [ECE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

4th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the studends to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	a. To assemble current series feedback amplifier and study its performance. b. To assemble a voltage shunt feedback amplifier and study its performance.
2.	To assemble an RC phase shift oscillator.
3.	To assemble a differential amplifier and obtain its CMRR.
4.	To study different applications of OP AMPS. a. OP-AMP as an inverting amplifier. b. OP AMP as a non inverting amplifier c. OP AMP as an integrator d. OP AMP as a differentiator
5.	To measure the following parameters of a typical OP-AMP. a. I/P Impedance b. O/P Impedance c. Slew rate d. CMRR
6.	Obtain frequency response of an OP-AMP & hence find its banwidth.
7.	Study performance of multivibrator circuits using 555 chip in following modes: a) Bistable b) Astable c) Monostable d) Use of 555 chip as a timer circuit
8.	To assemble a Schmitt trigger Circuit and to obtain its characteristics and to use it as squaring circuit.
9.	To assemble a Class A Power amplifier and to determine its power gain
10.	To study the performance of a voltage regulator IC Chip.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-405P** **Course Title** **Communication System-I LAB**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

4th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	Generation and detection of amplitude modulated signals.
2.	Generation and detection of frequency modulated signals.
3.	To measure sensitivity, selectivity, and fidelity of a radio receiver.
4.	To generate PAM and PDM signals using IC 555
5.	To test a pulse code modulator.
6.	To measure the noise figure of the following systems: a. A.M. System. b. F.M. System.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-406P** **Course Title** **Digital Electronics and Logic Design LAB**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

4th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	To verify the truth table of following logic gates: I. AND OR and NOT II. NAND, NOR, XOR and XNOR III. To realize the above gates using discrete active and passive components.
2.	To implement XOR and XNOR using universal logic gates.
3.	A. To verify De Morgans law using logic gates. B. To implement certain Boolean expressions and check their equality.
4.	To design and realize:- a. Half adder and verify its truth table. b. Full adder and verify its truth table. c. Half subtractor and verify its truth table d. Full subtractor and verify its truth table.
5.	To design a multiplexer/demultiplexer using two input NAND gates
6.	To design a 4 bit binary to decimal converter.
7.	To design a modulo-10 counter.
8.	Given a frequency f obtain the waveforms with frequencies f/2,f/5 & f/10.
9	Design and realize the following flip flops using logic gates. a. RS flip flop b. JK flip flop c. D flip flop d. T flip flop
10.	Use PLL as: a. Frequency multiplier. b. Frequency demodulator.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ELE-404P Course Title Control System LAB

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

4th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	To study the performance of Relay control Combination of P,I and D control schemes in a typical thermal system.(oven)
2.	To study the torque-speed characteristics of an AC servomotor.
3.	To study the time response of a variety of simulated linear systems.
4.	To study the role of feedback in a DC speed control system.
5.	To study the role of feedback in a DC position control system.
6.	To study the role of a combination of P,I and D control actions in a variety of simulated linear systems.
7.	To study the computer simulation of a number of systems.
8.	Use of MATLAB / SIMULINK /Control System tool boxes.

SYLLABUS OF SUBJECTS TAUGHT TO OTHER DEPARTMENTS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
	INFORMATION TECHNOLOGY ENGINEERING					
1.	ECE-403	Digital Electronics and Logic Design [IT]	3	1	0	4
2.	ECE-404P	Digital Electronics and Logic Design LAB[IT]	0	0	2	1
2.	ECE-408	Communication System –I [IT]	3	1	0	4
3.	ECE-409P	Communication System –I LAB [IT]	0	0	2	1
	COMPUTER SCIENCE ENGINERRING					
1.	ECE-403	Digital Electronics and Logic Design [CSE]	3	1	0	4
2.	ECE-404P	Digital Electronics and Logic Design LAB [CSE]	0	0	2	1
3.	ECE-408	Communication System -I [CSE]	3	1	0	4
4.	ECE-409P	Communication System -I LAB [CSE]	0	0	2	1
	ELECTRICAL ENGINEERING					
1.	ECE-402	Electronics-II [ELE]	2	1	0	3
2.	ECE-402P	Electronics-II LAB[ELE]	0	0	2	1
	CHEMICAL ENGINEERING					
1.	ECE-405	Electronics	3	1	0	4
2.	ECE-406P	Electronics Lab	0	0	2	1
	METALLURGY ENGINEERING					
1.	ECE-405	Electronics & Metallurgical Industrial Instrumentation	2	0	0	2
2.	ECE-406P	Laboratory Practice in Electronics & Metallurgical Industrial Instrumentation	0	0	2	1

5th SEM SYLLABUS

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

5th SEMESTER SYLLABUS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE501	Microprocessors	3	1	0	4
2.	ECE502	Applied EMF & Waves	3	1	0	4
3.	ECE503	Electronic Devices	3	1	0	4
4.	CSE509	Data Structures	3	1	0	4
5.	ECE505	Random processes Noise & Systems	3	1	0	4
6.	MTH504	Mathematics-V	2	1	0	3
7.	ECE506P	Microprocessors LAB	0	0	2	1
8.	CSE510P	Data Structures LAB	0	0	2	1
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-501** **Course Title** **Microprocessors [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective **To study the basics of microprocessors, programming the microprocessor for different control operations and interfacing it with peripherals.**

To understand the fundamentals of microcontrollers and using it in the areas of process control, robotics etc.

7. Pre-requisite **Knowledge of digital electronics and C fundamentals.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S. No	Particulars
1.	**Microcomputer Structure and Operations:** Basic Microcomputer Elements**,** Typical Microcomputer Structure**,** CPU**,** Memory System**,** Input Output.
2.	**Microprocessors and Memory:** Typical 8, 16 and 32 bit Microprocessors**,** 8085 Microprocessor Specification**,** Memory Technologies.
3.	**Assembly Language Programming I:** Programming Model of 8085**,** Registers**,** Fetch, Execute Operation of CPU**,** Instruction Set.
4.	**Assembly Language Programming II:** Addressing Modes**,** Basic Operations**,** Microprocessor Arithmetic**,** Program Flow Control Using Looping and Branching.
5.	**Assembly Language Programming III:** Stack**,** Subroutines**,** Interrupts, Resets.
6.	**Bus System I:** System Bus Structure**,** Bus Operations**,** Cycle by Cycle Operations**,** Timing and Control**,** Priority Management, Address Decoding.
7.	**Microprocessors Interfacing I:** Interfacing concepts**,** Parallel Input Output**,** Memory Interfacing, Direct Memory Access.
8.	**Microprocessors Interfacing II:** The Serial Subsystems.
9.	**Microprocessor Interfacing III:** Programmable**,** Peripheral Interface, Analog Converter Subsystem.
10.	**Introduction to INTEL 8086:** Basic features.
11.	**Micro controller:** 8051**,** 68HC11.
12.	**Application Examples:** Process Control**,** Robotics, CAI, Medical physics.
13.	**Latest Developments in Microprocessor Technology.**

10. Suggested Books

1.	**Microprocessor Architecture, programming and application**	**Ramesh Goankar**
2.	**Microprocessor and Applications**	**Leventhal**
3.	**Microprocessors**	**Mathur**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-502 **Course Title** Applied EMF & Waves [ECE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective To understand EMF in theory and practice, laws governing propagation of EMF in dielectric, transmission lines, standing wave ratios and impedance issues.

7. Pre-requisite Knowledge of electromagnetism and electrostatics.

8. Total Contact Hours ~ 35-40.

9. Details of the syllabus:

S.No.	Particulars
1.	**Electromagnetic Fields and Maxwell's Equations:** Review of Electric and Magnetic fields, Maxwell's Equations, Potential functions, Boundary conditions, Wave equation and its solution.
2.	**Plane Electromagnetic Waves:** Transverse Electromagnetic Waves, Poynting Theorem, Phase and group velocity, Plane waves in lossless and lossy media, Wave propagation in ferrites – faraday rotation and birefrigerence. Normal and oblique incidence at plane conducting boundary, Normal and oblique incidence at plane dielectric boundary.
3.	**Transmission Lines:** Transmission Line equations and solutions, Characteristic impedance and propagation constant, Reflection and transmission coefficients, SWR, Open and short circuit lines-their use as circuit elements at UHF, Line impedance and admittance , Smith Chart, Impedance Matching

10. Suggested Books

1.	Electromagnetic Waves & radiating systems, PHI	Jordan E and Balman K
2.	Field and Wave Electromagnetics, Addison Wesley	David K Cheng
3.	Electromagnetics, Mc Graw Hill	Krauss
4.	Introduction to Electrodynamics, PHI	Griffiths

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code	**ECE-503**	**Course Title**	**Electronic Devices [ECE]**						
2 Contact Hours		**L**	**3**	**T**	**1**		**P**	**0**	
3 Examination Duration (Hrs)		**Theory**	**02**			**Practical**	**00**		
4 Relative Weight age		**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits		**0**	**4**	**5th Sem**	●				
					Autumn	**Spring**			

6. Objective **To understand free electron theory, band theory of electronic conduction, semiconductor physics and optical devices.**

7. Pre-requisite **Knowledge of basic electronics.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S. No.	Particulars
1.	**Overview of Free Electron Theory**
2.	**Band Theory of Electronic Conduction:** Kroning Penny model, block wave Brillion zones, effective mass, density of states & energy discontinuity, electron and hole conduction.
3.	**Semiconductor Physics:** Fermi Dirac distribution functions, Fermi energy and contact potential, electronic conductivity and means free time. Intrinsic and Extrinsic semiconductors, free carrier concentration and Fermi level, donor and acceptor states, derivation of fermi level, carrier concentration and mobility, scattering mechanisms, semiconductor materials and their energy band structures.
4.	**Transport and Recombination Phenomenon.**
5.	**Physics of:** Metal semiconductor contact, p-n junction diodes, bipolar junction transistor, thyristor, junction field effect transistor, metal insulator semiconductor structure, MOSFET.
6.	**Optical Devices:** Junction, luminescence and energy band gap, spontaneous emission and carrier life time for band to band transition, stimulated emission, p-n junction laser, photo-detective and photo-conductive devices.

10. Suggested Books

1.	**Electronic Processes & Materials**	**Azaroff & Brophy**
2.	**Fundamentals of Solid State Devices & Circuits**	**Barlev**
3.	**Solid State Electronic Devices**	**Ben G. Streetman**
4.	**Fundamentals of Semiconductor Theory**	**S. Wang**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code CSE509 **Course Title Data Structures**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective **To understand efficient storage mechanisms of data for an easy access, design and implementation of various basic and advanced data structures.**

To study arrays, linked list, stacks, queues etc.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus

S.No.	Particulars
1.	**Introduction:** Basic concept of data, structures and pointers.
2.	**Arrays:** Representation, implementation, polynomial representation. Limitations.
3.	**Strings:** Representation, String operations, Implementing String.h library functions.
4.	**Linked List:** Static and dynamic implementation. Single, double, circular, multiple linked lists.
5.	**Stacks:** Recursion and Stacks. Static and dynamic implementation. Expression evaluation. Infix, postfix expressions, multiple stacks.
6.	**Queues:** Static and dynamic implementation, circular queues, and implementation.
7.	**Hash Tables:** Hash tables implementation. Hashing techniques, single, double.
8.	**Storage Management:** Memory Management techniques, garbage collection.
9.	**Trees:** Binary trees, binary search trees, static and dynamic implementation. Tree operations, insert, delete, and search.
10.	**Heaps:** Implementation, sorting etc.
11.	**Sorting and Searching:** Different sorting techniques. Insertion sort, selection sort, bubble sort, radix sort, quick sort, merge sort, heap sort.
12.	**Graphs:** Representation of graphs, BFS, DFS sort. Graph Algorithms.

10. Suggested Books

1.	**Data Structures**	**Rajni Jindal**
2.	**Data Structures**	**Schaum's Series**
3.	**Data Structures**	**Knuth**
4.	**Data Structures**	**Farouzan**
5.	**Data Structures using C and C++**	**Langsam, Augestern, Tanenbaum.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-505 Course Title Random Processes Noise & Systems[ECE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective

To understand the behavior of random variables, ensembles, distribution and averages.

To study different types of noise, coding and error correction in noisy environment, modulation schemes, information measure, rates and channel capacity.

7. Pre-requisite **Knowledge of signals and systems, transforms.**

8. Total Contact Hours **~ 40.**

9. Details of the syllabus:

S.No.	Particulars
1.	Random variables, ensembles, distributions and averages, correlation and power density spectra. Wiener Khintchine theorem. Shot noise, narrow band noise, white noise. Noise in Electronic devices. Trade off between SNR and bandwidth. Information measure, rates and channel capacity, noiseless coding, synchronizable codes, error correction, codes to combat noise. Relative performance of various modulation schemes

10. Suggested Books

1.	Probability, Random Variables & Stochastic Processes	Athanasios Papoulis

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **MTH – 504** **Course Title** **Mathematics-V**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

5th Sem	●	
	Autumn	Spring

6. Objective **To study complex variables, their functions and theorems, special functions and wavelet transform.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 38.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Complex Variables:** Analytic functions, Cauchy Riemann equations, complex integration, Cauchy's fundamental theorem, Cauchy's integral theorem, Cauchy's inequality and Liouville's theorem on integral function, Taylor's and Laurent's expansions, Zeroes and poles of analytic functions, Residues and contour integration.
2.	**Special Functions:** Solution of series, Legendres functions, Rodriguess formula, generating functions for Legendres Polynomials and recurrence formulae. Bessel's functions, Recurrence formulae and Bessel's functions of integral order.
3.	**Wavelet Transform:** Continuous wavelet transform, Basic properties of wavelet transform, Discrete wavelet transform, Orthonormal wavelets, multi Resolution analysis, Construction of Orthonormal wavelets, Daubchies wavelets and algorithms. Band limited wavelets, Balian low theorem.

10. Suggested Books

1.	**Complex Variables & Applications**	**R. V. Churchill**
2.	**Theory of Functions of Complex Variables**	**E. I. Copson**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-506P** **Course Title** **Microprocessor Lab [ECE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

5. Credits

0	1

5rd Sem	●	
	Autumn	Spring

6. Objective **To develop programs using 8085 instruction set, understanding of usage of microprocessor as an automatic controller.**

To develop programs for interaction between microprocessor and peripherals, understand usage of PPI-8255.

7. Pre-requisite **Familiarity with various types of number systems, C language.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	i) To develop a program to add two double byte numbers. ii)To develop a subroutine to add two floating point quantities.
2.	i)To develop program to multiply two single byte unsigned numbers, giving a 16 bit product . ii) To develop subroutine which will multiply two positive floating point numbers.
3.	To write program to evaluate P* Q+R*S where P,Q,R & S are 8 bit binary numbers.
4.	To write a program to divide a 4 byte number by another 4 byte number.
5.	To write a program to divide an 8 bit number by another 8 bit number upto a fractional quotient of 16 bit.
6.	Write a program for adding first N natural numbers and store the results in memory location X.
7.	Write a program which decrements a hex number stored in register C. The Program should half when the program register reads zero.
8.	Write a program to introduce a time delay of 100 ms using this program as a subroutine display numbers from 01H to OAH with the above calculated time delay between every two numbers.
9.	N hex numbers are stored at consecutive memory locations starting from X. Find the largest number and store it at location Y.
10.	Interface a display circuit with the microprocessor either directly with the bus or by using I/O ports. Write a program by which the data stored in a RAM table is displayed.
11.	To design and interface a circuit to read data from an A/D converter, using the 8255 A in the memory mapped I/O.
12.	To design and interface a circuit to convert digital data into analog signal using the 8255 A in the memory mapped I/O.
13.	To interface a keyboard with the microprocessor using 8279 chip and transfer the output to the printer.
14.	To design a circuit to interface a memory chip with microprocessor with given memory map.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **CSE510P** **Course Title** **Data Structures LAB.**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

5. Credits

0	1

5rd Sem	●	
	Autumn	Spring

6. Objective **To develop programs for ;**

- **Understanding Structures and Pointers**
- **Implementation of Stacks and Queues using arrays and link list.**
- **Implementation of sorting algorithms & hash tables.**

7. Pre-requisite **Nil**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
	Basic concepts of data, linear lists, strings, arrays and orthogonal lists, representation of trees & graphs, storage systems, Arrays, Recursion, Stacks, Queues, Linked lists, Binary trees, General Trees, Tree Traversal, Symbol Table and Searching Techniques, Sorting Techniques, graphs.
1.	Implement singly and doubly linked lists.
2.	Represent a polynomial as a linked list and write functions for polynomial addition.
3.	Implement stack and use it to convert infix to postfix expression
4.	Implement array-based circular queue and use it to simulate a producer-consumer problem.
5.	Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
6.	Implement binary search tree.
7.	Implement priority queue using heaps
8.	Implement hashing techniques
9.	Implement various sorting techniques as taught in class.
10.	Implement Dijkstra's algorithm using priority queues
11.	Implement Prim's and Kruskal's algorithms

SYLLABUS OF SUBJECTS TAUGHT TO OTHER DEPARTMENTS

S. No	Course No.	Course Title	L	T	P	No. of credits.
	INFORMATION TECHNOLOGY ENGINEERING					
1	ECE 506	DATA COMMUNICATIONS [IT]	3	1	0	4
	COMPUTER SCIENCE ENGINEERING					
1	ECE 506	DATA COMMUNICATIONS [CSE]	3	1	0	4
	ELECTRICAL ENGINEERING					
1	ECE 508	COMMUNICATION SYSTEMS-I [ELE]	2	1	0	3
2	ECE 509	DIGITAL ELECTRONICS AND LOGIC DESIGN	3	1	0	3
3	ECE 510P	DIGITAL ELECTRONICS AND LOGIC DESIGN LAB.	0	0	2	1
	MECHANICAL ENGINEERING					
1	ECE 507	INDUSTRIAL ELECTRONICS [MECH]	2	1	0	3

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-506** **Course Title** **Data Communications [IT]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective **To study various network topologies, encoding techniques, multiplexing, error detection and correction of data.**

7. Pre-requisite **Knowledge of basic communication systems.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S. No.	Particulars
1.	**Data and Signals:** Data, Signals, Types of Signals, Bandwidth, spectrum, Digitization of analog signals, sampling, Nyquist sampling theorem, quantization, quantization noise, Pulse code modulation
2.	**Digital modulation Techniques:** ASK, FSK, PSK, DPSK, M-ary PSK, QAM. Signal constellation**.**
3.	**Line coding techniques:** NRZ, RZ, Biphase, Manchester coding, AMI, HDBn
4.	**Transmission media:** Guided and un-guided media, twisted wire pair, co-axial cable, optical fibre, microwave links, satellite microwave link, their characteristic features and applications for data transmission.
5.	**Data transmission:** simplex, half duplex and full duplex, Asynchronous and synchronous data transmission. Carrier, bit and frame synchronization techniques, Phase lock loop.
6.	**Multiplexing Techniques:** Frequency Division Multiplexing, Time Division Multiplexing, Wavelength division Multiplexing and Code Division Multiplexing. Spread Spectrum.
7.	**Errors in data communication:** Types of errors, error detection and correction techniques, forward error correction, polynomial error detection scheme, computation of CRC. Hardware.
8.	**Data communication network:** Basic concept of network, Advantages and applications, Types of networks (LAN, MAN and WAN), Different network topologies like star, ring, hybrid, tree.

10. Suggested Books

1.	**Data & Computer Communications, 7th Ed, PHI**	**William Stallings**
2.	**Computer Networks PHI**	**Andrew Tanenbaum**
3.	**Digital Communications fundamentals & Applications 2nd Ed Pearson Pub.**	**Sklar**
4.	**Local Area Networks McGraw Hill**	**Keizer**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-506** **Course Title** **Data Communications [CSE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

5th Sem	●	
	Autumn	Spring

6. Objective **To study various network topologies, encoding techniques, multiplexing, error detection and correction of data.**

7. Pre-requisite **Knowledge of basic communication systems.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Data and Signals:** Data, Signals, Types of Signals, Bandwidth, spectrum, Digitization of analog signals, sampling, Nyquist sampling theorem, quantization, quantization noise, Pulse code modulation
2.	**Digital modulation Techniques:** ASK, FSK, PSK, DPSK, M-ary PSK, QAM. Signal constellation**.**
3.	**Line coding techniques:** NRZ, RZ, Biphase, Manchester coding, AMI, HDBn
4.	**Transmission media:** Guided and un-guided media, twisted wire pair, co-axial cable, optical fibre, microwave links, satellite microwave link, their characteristic features and applications for data transmission.
5.	**Data transmission:** simplex, half duplex and full duplex, Asynchronous and synchronous data transmission. Carrier, bit and frame synchronization techniques, Phase lock loop.
6.	**Multiplexing Techniques:** Frequency Division Multiplexing, Time Division Multiplexing, Wavelength division Multiplexing and Code Division Multiplexing. Spread Spectrum.
7.	**Errors in data communication:** Types of errors, error detection and correction techniques, forward error correction, polynomial error detection scheme, computation of CRC. Hardware.
8.	**Data communication network:** Basic concept of network, Advantages and applications, Types of networks (LAN, MAN and WAN), Different network topologies like star, ring, hybrid, tree.

10. Suggested Books

1.	**Data & Computer Communications, 7th Ed, PHI**	**William Stallings**
2.	**Computer Networks PHI**	**Andrew Tanenbaum**
3.	**Digital Communications fundamentals & Applications 2nd Ed Pearson Pub.**	**Sklar**
4.	**Local Area Networks McGraw Hill**	**Keizer**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE 508** **Course Title** **Communication Systems-I [ELE]**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

5th Sem	●	
	Autumn	Spring

6. Objective **To analyse various analog modulation & demodulation schemes, to understand operation of AM & FM radio receivers, to perform noise analysis of AM & FM systems, to understand baseband & broadband digital modulation schemes.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S. No.	Particulars
1.	**Spectral analysis of Signals:** Fourier series of repetitive signals, Fourier transform of non- repetitive signals, amplitude spectrum of special signals viz. Pulse train and pulse waveform
2.	**Modulation:** AM, DSB/SC, SSB, VSB, Angle modulation, NBFM, WBFM, Diode detector, Frequency discriminator, AM & FM, Transmitter
3.	**Demodulation:** AM and FM signals, Radio Receivers – AM & FM
4.	**Noise Analysis:** Performance of AM & FM Systems, in presence of noise Threshold in AM & FM Demodulations, Pre- emphasis, and De-emphasis in FM Systems
5.	**Digital Communication**: Sampling, Quantization, Quantization noise, Coding, Pulse code Modulation; Differential PCM, ADPCM, Relative advantages and dis-advantages. Delta modulation. PWM & PPM
6.	**Digital Modulation Techniques:** ASK, FSK, PSK, M-FSK, DPSK, GPSK schemes

10. Suggested Books

1.	**Electronics communication System**	**G. Kennedy**
2.	**Principles of Communication system**	**Taub and Schilling**
3.	**Communication Systems**	**S. Haykins**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-509** **Course Title** **DIGITAL ELECTRONICS AND LOGIC DESIGN [ELE]**

2 Contact Hours

L	3	T	1	P	2

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	5

5th Sem	●	
	Autumn	Spring

6. Objective **To study number systems, simplification and implementation of digital functions, design & analysis of various combinational and sequential circuits, memory organization.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S. No.	Particulars
1.	Review of Binary, octal and hexadecimal number systems. Various types of codes
2.	Boolean algebra and Boolean theorems.
3.	Logic gates and implementation of Boolean functions with various types of logic gates. Circuit equivalence
4.	Simplification techniques and minimization by map methods. Tabular method
5.	Combination logic and arithmetic circuits. Encoders and Decoders, multiplexer & de-multiplexer
6.	Sequential circuits –state diagrams and state tables, design and analysis of flip-flops, registers, counters. Synchronous and asynchronous operation of sequential circuits. Analog to digital convertor, digital to analog convertor
7.	Latches and memory organization. ROM's, EPROM's and RAM's –Dynamic and static
8.	Introduction to PLA's 02
9.	IEEE notations

10. Suggested Books

1.	**Digital logic**	**M. Morris Mano**
2.	**Digital principles and applications**	**A.P. Malvino**
3.	**Switching circuits**	**Marcus2**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-507** **Course Title** **Industrial Electronics [MECH]**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

5th Sem	●	
	Autumn	Spring

6. Objective **To familiarize with the basic semiconductor materials and to know about the working and performance of devices like BJTs and FETs.**

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Semiconductors:** Intrinsic and extrinsic semiconductors transport mechanism of charge carriers, electric properties, Hall effect etc. Electronic Devices, their characteristics and applications.
2.	**P-N junction diode Current components in p-n junction,** Characteristics-piece wise linear approximation, temperature dependence, Diode capacitance, and switching times, diode circuits half wave, full wave rectifiers, clipping circuits etc. Basic operations of Zener, avalanche, schottky photo and tunnel diodes.
3.	**BJT's Types operation and characteristics,** Ebers-Moll model, CE, CB and CC configuration input, output characteristics and graphical analysis of basic amplifier circuits, Biasing and Bias stability, Low frequency, h-parameter model, Analysis and Design of transistor amplifier circuits using h-parameters. High frequency hybrid – pi model, analysis and design of transistor amplifier circuits at high frequencies. Multistage amplifiers, phototransistors, Transistor as a switch, SCR's and Thyistors.
4.	**FET's Operation and characteristics,** model Application at low and high frequency, amplifiers, switching circuits, MOSFET TYPES, Operation and characteristics.
5.	**Introduction to IGBT.**

10. Suggested Books

1.	**Integrated Electronics**	**by J. Millman & C. Halkias**
2.	**Microelectronics**	**by Sedra & Smith**
3.	**Electronic Circuits**	**by D. Schelling & Belove**
4.	**Electronic Devices & Circuits**	**by R. Boylestad**

6th SEM SYLLABUS

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

6th SEMESTER SYLLABUS

S. No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE601	Communication System-II	3	1	0	4
2.	ECE602	VLSI Design	3	1	0	4
3.	ECE603	Computer Organization & Architecture	3	1	0	4
4.	ECE604	Data Communications & Networking	3	1	0	4
5.	ECE605	Multimedia Systems	3	1	0	4
6.	ELE603	Power Electronics	2	1	0	3
7.	ECE606P	Electronic Design & Automation Tools I	0	0	2	1
8.	ELE604P	Power Electronics Lab	0	0	2	1
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT:		**ELECTRONICS AND COMMUNICATION**	
1 Subject Code	**ECE-601**	**Course Title**	**Communication Systems II [ECE]**
2 Contact Hours	**L 3**	**T 1**	**P 0**
3 Examination Duration (Hrs)	**Theory 02**	**Practical 00**	
4 Relative Weight age	**M-I 20**	**M-II 20**	**ASM/CA 10** **ME 50**
5. Credits	**0 4**	**6th Sem**	**Autumn** ● **Spring**
6. Objective	**To study propagation of transverse EM waves, modes, radiation of EM waves through simple dipole, radiation mechanisms, types of antennas and satellite communication.**		
7. Pre-requisite	**Knowledge of basic communication systems.**		
8. Total Contact Hours	**~ 35-40.**		

9. Details of the syllabus:

S.No.	Particulars
1.	**Waveguides and Cavity Resonators**: Transverse Electric and Transverse magnetic Waves, Wave propagation through rectangular and circular waveguides, Power transmission and attenuation in waveguides, Electromagnetic Resonators, Rectangular & Circular cavities
2.	**Strip Lines:** Propagation Constant, Characteristic impedance and attenuation characteristics of strip lines and microstrips
3.	**Propagation of Waves:** Waves in free space, Attenuation, Absorption and polarization, effects of environment, Ground wave propagation, sky wave propagation, space wave propagation, Troposcatter propagation and Extra-terrestrial propagation
4.	**Radiation:** Retarded Potential and Electromagnetic field, Radiation from a short current element, Half wave dipole, Radiation Resistance, Effect of ground on radiating elements
5.	**Antennas:** Basic Antenna parameters, Radiation pattern, Directivity and Antenna Gain, Bandwidth and beam-width, Polarization, Folded dipole and applications. Antenna arrays, Parabolic reflector, Properties and feed mechanism, Horn Antenna, Loop Antenna.
6.	. Satellite Communication

10. Suggested Books

1.	**Microwave Devices & Circuits**	**S. Y Liao**
2.	**Microwave Engineering**	**David Pozar- John Wiley**
3.	**Electromagnetic Waves & Radiating Systems**	**E. Jordan and K Balmain**
4.	**Antennas**	**J.D Krauss, Mc Graw Hill**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-602 Course Title VLSI Design [ECE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6th Sem		●
	Autumn	Spring

6. Objective **To understand mosfet mechanism as a building block of digital circuits, technology to manufacture them and operation of various logic families.**

7. Pre-requisite **Knowledge of electronics.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Review of MOSFET**: Constructional & Operational features of MOSFET, I-V Equation, 2ND Order Effects, MOS Capacitor, C-V Characteristics, MOSFET Switch, Transmission gate, CMOS Inverter (Pull-up & Pull-down), Inverter Static Characteristics, ßn/ ßp Ratio, ?n/ ?p Rtaio, Noise Margin, Switching characteristics of Inverter (Fall Time, Rise Time, Delay Time), Dynamic Characteristics, Power Dissipation
2.	**VLSI Technology:** Wafer Processing, Oxidation, Epitaxy, Deposition, Ion-Implantation & Diffusion, The Silicon gate Process, n-well CMOS Process, p-well Process, Twin-Tub Process, Silicon On Insulator.
3.	**CMOS Logic Design (Gates):** CMOS Logic Gate Design (NAND & NOR Logic), Switching Characteristics (Delay Time, Power, Fan-in, Fan-out), Transistor Sizing, The Compound Gates.
4.	**CMOS Logic Structures:** CMOS Logic, Pseudo-nMOS Logic, Dynamic CMOS Logic, C2MOS Logic, BiCMOS Logic, NP Domino Logic.
5.	**Layout**: Design Rules/Floor planning, Simple Layout Examples**.**
6.	**CMOS Logic Design (Circuits):** Multiplexers, MUX Implementation in CMOS & Transmission Gate, RAM Cell Implementation, Implementation of Flip-Flop, Register/Counter

10. Suggested Books

1.	**CMOS VLSI Design: A Systems Perspective**	**N. Weste & K. Eshraghian**
2.	**CMOS VLSI Design: A Circuits & Systems Perspective**	**by N. Weste, D. Harris & A. Bannerjee**
3.	**Digital Integrated Circuits: A Design Perspective**	**Rabaey**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-603 Course Title Computer Organization &Architecture [ECE]

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6th Sem		●
	Autumn	Spring

6. Objective **To study the basic structure and organization of computer and its modules, instruction execution, peripheral devices, memories and organization.**

7. Pre-requisite **Knowledge of microprocessors**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	Introduction to computer architecture and organization: Basic structure of computers, Operational concepts, performance.
2.	Computer Organization and instruction cycle control: Machine Instructions & Programs, Memory location & Adresses, Instruction & Instruction Sequencing, Adressing modes, Stacks & Queues, Subroutines, Additional Instructions and Encoding of Machine Instructions.
3.	CPU organization: Fundamental concepts, Execution of a complete Instruction, Multiple Bus organization, Hardwired control, Microprogrammed control.
4.	I/O devices and Organization: Accessing I/O devices, Interrupts, DMA, Buses, Interface Circuits, Standard I/O Interfaces & Computer peripherals.
5.	Types of memories and memory organization: Basic Concepts, Semiconductor RAM Memories, ROM's Cache Memories, performance Considerations, Virtual Memories, Secondary Storage.
6.	Arithmetic addition & Subtraction of Signed numbers, Design of fast adders, Multiplication of Positive numbers, Signed-Operand Multiplication, Fast Multiplication, Integer Division, Floating Point Numbers & Operations.
7.	Introduction to Pipelining & Embedded Systems.

10. Suggested Books

1.	**Computer Organization & Architecture**	**M. Mano**
2.	**Computer organization**	**by Hamachar**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE – 604** **Course Title** **Data Communications & Networking[ECE]**

2.Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6th Sem		●
	Autumn	Spring

6. Objective **To study the techniques of data communication, encoding and protocols, error detection, correction and multiplexing.**

To understand network topologies, routing and switching techniques of data transmission.

7. Pre-requisite **Knowledge of basic communication systems.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	Data Transmission, data encoding, digital data communication technique
2.	Error detecting and error correcting technique, nature of transmission errors, error detecting codes, error correcting codes, retransmission techniques.
3.	Multiplexing and de-multiplexing techniques viz.., TDM, FDM.
4.	Synchronous and asynchronous communications, carriers, bit and frame synchronization
5.	OSI reference model
6.	Introduction to transmission media and network topologies, MAN, LAN, WAN.
7.	Circuit switching, message switching and packet switching, relative advantages and disadvantages
8.	Routing techniques, flooding static routing, centralized routing, distributed routing**.**
9.	Multiple access scheme viz., TDMA, FDMA, ALOHA, CSMA techniques.
10.	Integrated services, digital network, broadband ISDN.
11.	Link level protocols.

10. Suggested Books

1.	**Data Communications and Computer Networking**	**W. Stallings**
2.	**Data Communications and Computer Networking**	**Behrouz Forouzan**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-605** **Course Title** **Multimedia Systems[ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6th Sem		
	Autumn	Spring

6. Objective **To study about microphones & loudspeakers their construction and working, digital recording systems, public address systems.**

To make students familiar with display technologies and Public address systems.

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Microphones & Loudspeakers :** Construction, Working and applications of following microphones: Moving Coil microphone, Carbon microphone, Condenser microphone, and Cordless microphone. Direct radiating, Horn loaded loudspeakers, Woofer, Tweeter, Squawker. Loudspeaker baffles and enclosures
2.	**Public address systems:** Requirements of a public address (PA) system, Block diagram operation of a PA system, Signal distribution and output power requirements**.**
3.	**Video Recording and playback: Principles** of video recording and playback principles on tape & disc, Remote Controls.
4.	**Display Technologies:** LCD, TFT, CCD.
5.	**Digital Recording Techniques:** Digital recording of audio & video signals, Digital Audio Tape (DAT). Recording on Compact Discs & DVD's.
6.	**Cable TV & Dish TV Systems**
7.	**Standards for Multimedia Communication**

10. Suggested Books

1.	**Audio & Video Systems**	**Gupta & Gupta**
2.	**TV Engineering**	**R R Gulati**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ELE-603** **Course Title** **Power Electronics[ECE]**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6th Sem		
	Autumn	Spring

6. Objective **To understand the fundamentals of power devices like diodes, transistors, Thyristors , phase control circuits, converters etc.**

7. Pre-requisite **Knowledge of basic electronics.**

8. Total Contact Hours **~ 38.**

9. Details of the syllabus:

S.No.	Particulars
1.	**An Introduction to Thyristor Engineering.**
2.	**Power Electronic Devices:** Heavy current and high voltage solid state devices, power diodes, power transistors, SCR's. Triacs Diacs and other Thyristors, Basic theory of operation and characteristics of SCR, Ratings, protection, series and parallel operation of SCRs. Driving circuits, GIO"s, IGBT,MOSFET.
3.	**Firing Circuits**: Line commutation of SCRs and forced commutation techniques.
4.	**Line Commutated Converters:** 2 pulse, 3 pulse, 6 pulse and higher pulse configurations.
5.	**AC Phase Control:** Integral cycle control**.**
6.	**Choppers:** Principle and basic chopper circuits.
7.	**Inverters:** Series parallel and bridge inverters and voltage control.
8.	**Application of Thyristor Technology to Electric Drives.**
9.	**Design of transformers, pulse transformer and design of inductors.**

10. Suggested Books

1.	**Power Electronics**	**Rashid**
2.	**Power Electronics**	**Ned Mohan**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-606P** **Course Title** **Electronic Design & Automation Tools - I[ECE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

6th Sem		●
	Autumn	Spring

6. Objective **To study the design of various electronic circuits and systems using automatic simulation tools.**

Awareness of various simulation tools.

7. Pre-requisite **Nil.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	SPICE
2.	MATLAB
3.	ANSYS
4.	Any other electronic simulator available

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ELE-604P** **Course Title** **Power Electronics LAB [ECE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

6th Sem		●
	Autumn	Spring

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	(a) To obtain V-I Characteristics of an SCR. (b) To obtain V-I Characteristics of a Triac.
2.	To obtain the Static Emitter Characteristics of a UJT.
3.	To study the Line-synchronized UJT Relaxation Oscillator as a triggering agent for a thyristor and plot load voltage Vs. firing angle.
4.	To study various firing schemes of an SCR and draw the traces for various waveforms:Resistance Triggering Technique, (a) R-C Triggering Technique, (b) Linear Firing Scheme, (c) Inverse Cosine Firing Scheme.
5.	To study a Single-Phase Half-Wave Converter and plot Source voltage, Load voltage and load current for R and R-L loads.
6.	To study a Single-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
7.	To study a Single-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
8.	To study a Three-Phase Semi-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
9.	To study a Three-Phase Full-Converter and plot Source voltage, Source current, Load voltage and load current for R, R-L and Motor Loads.
10.	To study a Single-Phase Dual Converter on Motor Load.
11.	To study a DC-DC Buck Converter (Step Down Chopper) for R, R-L and DC Motor Load and plot Load voltage Vs. Duty Ratio.
12.	To study a Single-Phase Voltage Source Inverter on R and R-L Loads.

13.	To study a Three-Phase Voltage Source Inverter on R and R-L Loads.

7th SEM SYLLABUS

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

7th SEMESTER SYLLABUS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE701	Project Pre-work	0	0	2	1
2.	ECE702	Seminar	0	0	2	1
3.	ECE703	Digital Signal Processing	3	1	0	4
4.	ECE704	Wireless Communications	3	1	0	4
5.	ECE705	Measurement & Instrumentation	3	1	0	4
6.	ELE70	Electrical Power Systems	2	1	0	3
7.	ECEXXXE	Elective-I	2	1	0	3
8.	ECEXXXE	Elective-II	2	1	0	3
9.	ECE 707	Electronic Design And Automation Tools II	0	0	2	1
10.	ELE 70 P	Electrical Power System Lab	0	0	2	1
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-701** **Course Title** **Project pre-work**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4. Credits

0	1

7th Sem	●	
	Autumn	Spring

5. Objective **To teach students how the problem to be implemented is searched, then implemented and tested.**

6. Pre-requisite **The students should have a fair knowledge of electronics.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-702** **Course Title** **Seminar**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4. Credits

0	1

7th Sem	●	
	Autumn	Spring

6. Objective **To teach students how the research about a particular topic is done, how it's presented and delivered to the complete satisfaction of the audience**

7. Pre-requisite **Nill.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-703** **Course Title** **Digital Signal Processing [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

7th Sem	●	
	Autumn	Spring

6. Objective **To acquire knowledge and become familiar with various types of signals, 2D signals, different types of systems, filter design & to develop the concept of various mathematical tools like Fourier transform, z transform, finite modeling ,etc.**

7. Pre-requisite **Basic concepts of signals and systems should be clear to the students.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction**:-Discrete time signals and systems frequency domain representation
2.	**Transforms**:-Z- transform, Discrete Fourier transform. Discrete correlation and correlator, Two dimensional signals and systems and their frequency domain representations. Discrete Hilbert transform. Fast Fourier transform
3.	**Algorithms**: - Computational consideration. Bluestein chirp – z transform Algorithm.
4.	**Filters: -** Digital filters. Representation, form realization. Design of digital filters, specification and design techniques. IIR and FIR digital filters.
5.	Finite modeling effect in digital signal processing applications.
6.	Introduction to DSP processors.

10. Suggested Books

1.	**Digital Signal processing**	**Proakis**
2.	**Digital Signal Processing**	**Chittod**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-704** **Course Title** **Wireless Communications [ECE]**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

7th Sem	●	
	Autumn	Spring

6. Objective **To introduce basic cellular concepts & to develop the understanding of frequency reuse, cell splitting, shadowing, fading, GSM standards, mobility management,IS-95, GPRS, etc.**

7. Pre-requisite **The students should have the knowledge of communication& data communication**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Classification of wireless systems Types of Services, Requirements for the services, Performance parameters in wireless communications, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Economic considerations, Standards
2.	**Propagation Channels:** Radio Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models.
3.	**Diversity**: Diversity modeling, BER performance Improvement with Diversity, Types of Diversity – Frequency, Time, Space
4.	**Cellular Communication:** Introduction to Cellular Communications, Frequency reuse, Basic theory of cell layout, Cellular Processes - Call Setup, Handover etc,
5.	**Multiple Access Schemes:** FDMA, TDMA, CDMA, and Random multiple accesses, Comparison, Performance Analysis issues, and Design.
6.	**Recent Trends:** UWB, MIMO, 4G & 5G, Cognitive Radio, Network on a chip.

10. Suggested Books

1.	**Wireless Communications**	**Andreas F. Molisch.**
2.	**Wireless Communications Principles and Practice**	**Rappaport.**
3.	**Wireless Communications and Networks**	**Stallings.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE 705** **Course Title** **Measurements and Instrumentation**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**4**	**7th Sem**	●	
				Autumn	**Spring**

6. Objective **To introduce the instrumentation system, to teach the construction, operation of various transducers, sensors, etc, to develop the concept of function generators, frequency counters, data acquisition systems, interfacing of micro controllers and basic GPIB techniques.**

7. Pre-requisite **The students must be familiar with circuit analysis & microcontrollers**

8. Total Contact Hours **~ 40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Measurement System and Standards:** Instrumentation System and its classification, Primary and secondary standards, Standards of various electrical quantities, IEEE standards, Static and Dynamic response, Errors, and accuracy of an instrumentation system.
2.	**Measurement of Basic Parameters:** Galvanometer and its principle, Moving Coil, Moving iron meters, true rms meter, Bridge measurements, Q meters, Measurement of Voltage, Current, Power, Energy. Measurement of Resistance, Capacitance, Inductance.
3.	**Transducers, Sensors, and Actuators:** Active and Passive, Transducers types: Resistive, Inductive, capacitive, Piezoelectric, Optical, Photo diodes; Measurement of Physical, Physiological, Chemical quantities: (Temperature, pH, Luminescence, Flow, Pressure, Torque, Speed, acceleration, Rotation, Stress, Strain, etc,), Sensors for hostile environments, Actuators: Relays, Solenoids, Stepper motors.
4.	**Signal Generators and Analyzers:** Function generators, RF Signal Generator, Sweep Generator, Frequency synthesizer, Wave Analyzers for Audio and radio frequency waves. Measurement of harmonic distortion. Spectrum analysis, RF Power measurement.
5.	**Digital Instrumentation:** Comparison of analog and digital techniques, Digital voltmeter, Digital multimeter, Frequency counter, Measurement of frequency and time interval, extension of frequency range, Measurement errors.
6.	**Data Acquisition System:** Components of data acquisition system, Interfacing of transducers, Single Channel and Multi-channel system, Multiplexing, interfacing with micro controllers, IEEE 488 Bus, Automated data acquisition,
7.	**Advanced topics:** Virtual Instrumentation, Low level measurements and Noise rejection, GPIB based measurement techniques. Measurements using MEMS
8.	**Measurement System and Standards:** Instrumentation System and its classification, Primary and secondary standards, Standards of various electrical quantities, IEEE standards, Static and Dynamic response, Errors, and accuracy of an instrumentation system.

10. Suggested Books

1.	**Electronic Measurements**	**W Cooper**
2.	**Electrical & Electronic Measurements**	**A K Sawhney**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ELE703 **Course Title** **Electric Power System**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

7th Sem	●	
	Autumn	Spring

6. Objective **To introduce the students to the concept of power systems, AC & DC distributors, transmission lines and to develop the concept of mechanical design of transmission lines.**

7. Pre-requisite **The students should be familiar with the basics of electrical engineering.**

8. Total Contact Hours **~ 38.**

9. Details of the syllabus:

S.No.	Particulars
1.	**DC and AC Distribution System** Introduction to a power system (an overall view) distribution systems Feeder, distribution, service Mains classification, connection schemes, various types of DC and AC distributors, voltage drop calculations.
2.	**Overhead AC Transmission lines:-** Line Parameters, types of conductors. Aluminum Core Steel Reinforced (ACSR) etc. Stranding, bundling of conductors, Resistance calculations, skin effect, proximity effect. Inductance and capacitance and capacitance of single Phase, 3 phase, single circuit and double circuit lines. Representations and performance of short medium and log lines, ABCD constants, surge impedance, Feranti effect, Power flow through a transmission lines.
3.	**Insulators for overhead lines:--** Materials for insulators, types of insulators, potential distribution over a string of suspension insulators, methods for equalizing the potential.
4.	**Interference of power lines with communication circuits**:- Electrostatic and electromagnetic effect. Corona: Visual and critical disruptive voltage, conditions effecting corona, former loss due to corona, Practical consideration.
5.	**Mechanical design of transmission lines**. Sag and tension calculations.

10. Suggested Books

1.	Elements of Power System Analysis	W D Stevenson
2.	Transmission & Distribution of Electrical Energy	H Cotton & Barber
3.	Power System Engg	Nagrath & Kothari
4.	Electrical Power Systems	CL Wadhwa

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-707** **Course Title** **Electronic Design & Automation Tools II LAB [ECE]**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

7th Sem	●	
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Details of the syllabus:

S.No.	Particulars
1.	Installation of Scilab with the basic information of Scilab workspace and working directory.
2.	Creating matrices and some simple matrix operations
3.	Statistics and working with polynomials
4.	Scilab Programming language-looping and branching
5.	Script files and function files, Writing Scilab functions
6.	Graphics and Plotting- 2D graphs, 3D graphs
7.	Creating Histogram, animations
8.	Working with Applications-XCOS with examples in signal processing.
9.	Matlab to Scilab convertor
10.	Working with Atoms- Image processing module (SIVP), METANET

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ELE-703P **Course Title** **Electric Power System LAB**

2 Contact Hours

L	0	T	0	P	2

3 Examination Duration (Hrs)

Theory	00	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

7th Sem	●	
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Details of the syllabus:

S.No.	Particulars
1.	A.C distribution
2.	D.C. distribution
3.	Efficiency, Regulation & ABCD parameters of Transmission line
4.	Study of cables & find charging current
5.	Study of different types of insulators.

SYLLABUS OF SUBJECTS TAUGHT TO OTHER DEPARTMENTS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
	ELECTRICAL ENGINEERING					
1.	ECE-708	Measurement & Instrumentation	2	1	0	3

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-708** **Course Title** **Measurement & Instrumentation [ELE]**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

7th Sem	●	
	Autumn	Spring

6. Objective **To introduce the instrumentation system, to teach the construction, operation of various transducers, sensors, etc, to develop the concept of function generators, frequency counters, data acquisition systems, interfacing of micro controllers and basic GPIB techniques**

7. Pre-requisite **The students must be familiar with circuit analysis & microcontrollers.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Instrumentation System:-**classification of instrumentation errors, basic features of instrumentation system, dynamic response, accuracy of instrumentation system
2.	**Transducers:-**transducers of following types: resistance, inductance, capacitance ,piezoelectric, optical and digital, measurement of various electrical &non electrical quantities(temp ,torque, speed, stress, strain, etc.)
3.	**Instrumentation Amplifiers**
4.	**Wave Analyzers:-**analyzers for audio and radio frequency waves, measurement of distortion, spectrum analysis.
5.	**Phase and frequency measurements:-**analog and digital measurement of frequency and time.
6.	**Data acquisition System:-**components of data acquisition system, sample and hold circuit, recorders, strip chart recorders, magnetic tape recorders, digital recorder, ultraviolet recorder, heat sensitive recorder, single channel and multi-channel data acquisition system, using DAC,ADC and multiplexing.
7.	Microprocessor based measurement techniques.

10. Suggested Books

1.	**Electronic Measurements**	**W. Cooper**
2.	**Electrical & Electronic Measurements**	**A. K. Sawhney**

8th SEM SYLLABUS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

8th SEMESTER SYLLABUS

S.No.	Course No.	Course Title	L	T	P	No. of Credits
1.	ECE801	Project & Viva	0	0	16	8
2.	ECE802	Industrial Training / Industrial Project	-	-	-	1
3.	ECE803	Computer and Network Security	2	1	0	3
4.	ECE804	Microwave Engineering	2	1	0	3
5.	ECEXXXE	Elective II	2	1	0	3
6.	ECEXXXE	Elective III	2	1	0	3
7.	HSS801	Industrial Organization and Management	2	1	0	3
8	ECE805P	Microwave Engineering Lab	0	0	2	1
9.	ECEXXXEP	Elective III Advanced Lab	0	0	2	Audit
			Total Credits			**25**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-801** **Course Title** **Project & Viva [ECE]**

2 Contact Hours

L	-	T	-	P	16

3 Examination Duration (Hrs)

Theory	-	Practical	-

4 Relative Weight age

M-I	-	M-II	-	ASM/CA	-	ME	100

5. Credits

0	8

8th Sem		●
	Autumn	Spring

6. Objective **Students need to select a standard project related to electronics and communication. The project has to be workable to be demonstrated practically. Extensive literature review is to be carried out related to the project and same is to be submitted in form of a thesis. Related project will be completed with a power point presentation and viva.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **NA**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-802** **Course Title** **Industrial Training / Industrial Project [ECE]**

2 Contact Hours

L	-	T	-	P	-

3 Examination Duration (Hrs)

Theory	-	Practical	-

4 Relative Weight age

M-I	-	M-II	-	ASM/CA	-	ME	-

5. Credits

1

8th Sem		●
	Autumn	Spring

6. Objective **Students are required to be a part of industrial organization and understand the implementation of technology there. The practical knowledge gained is to be presented in form of detailed report of work experience. The course will be evaluated on basis of viva and report.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **NA.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-803** **Course Title** **Computer & Network Security [ECE]**

2 Contact Hours

L	2	T	1	P	-

3 Examination Duration (Hrs)

Theory	02	Practical	-

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

8th Sem		
	Autumn	Spring

6. Objective **To develop an understanding of security on computer networks, various cipher techniques, public key cryptography, authentication, virtual private networks, firewalls.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Need of security, Security attacks, services and mechanisms, Network security, Model.
2.	**Symmetric Ciphers:** Substitution and transposition techniques, Block cipher Principles and Modes of operation DES, Triple DES, Stream Ciphers and RC4.
3.	**Public Key Cryptography:** Need and principles of Public key cryptosystems, RSA Algorithm, Key, Distribution and management, Diffie-Hellman Key Exchange, Digital Signatures.
4.	**Authentication:** Authentication Requirements, Message Authentication Codes, Hashes, MD5and SHA, User Authentication: Password, Certificate based and biometric authentication, Kerberos.
5.	**Network Security:** Firewalls, IP Security, Virtual Private Networks and Intrusion Detection, Web Security-SSL and TLS.

10. Suggested Books:

1.	**Cryptography and Network Security, PHI**	**William Stalling**
2.	**Cryptography and Network Security, Mc Graw Hill**	**Atul Kahate**
3.	**Cryptography and Network Security, PHI 4.**	**Forouzan**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-804** **Course Title** **Microwave Engineering [ECE]**

2 Contact Hours

L	2	T	1	P	-

3 Examination Duration (Hrs)

Theory	02	Practical	-

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

8th Sem		
	Autumn	Spring

6. Objective **To understand basics of microwave communication, various active and passive devices, microwave amplifiers and oscillators.**

7. Pre-requisite **NA**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Microwave Communication:** Need, Advantages and application of microwave signals.
2.	**Microwave Passive Devices:** Scattering Matrix (S Parameter) representation of multi-port networks, Tees, Directional Coupler, Circulator and Isolator.
3.	**Microwave Active Devices:** Limitations of conventional vacuum tubes at microwave frequencies, Klystrons, Traveling wave tube, Magnetron, Microwave Detectors, Mixers-Single ended and Balanced.
4.	**High Frequency Devices:** PIN diode, Varactor diode, Tunnel diode, Read diode , IMPATT, TRAPATT and Gunn diode, Microwave Switches
5.	**Microwave Amplifiers and Oscillators:** Microwave Transistors-Bipolar and Field Effect Transistor Characteristics, Gain and Stability, Microwave Amplifier design, Gunn and transistor oscillators.

10. Suggested Books:

1.	**Microwave Devices & Circuits, PHI**	**Liao, S. Y**
2.	**Microwave Engineering, John Wiley**	**David Pozar**
3.	**Foundations for Microwave Engineering**	**R E Collin**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **HSS-801** **Course Title** **Industrial Organization & Management**

2 Contact Hours

L	2	T	1	P	-

3 Examination Duration (Hrs)

Theory	02	Practical	-

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

8th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **Nil.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	Industry, meaning of Industrialization, Industrial revolution, Need problems and prospects of Industrial change in the developing countries.
2.	Industrial Evolution in India. Downfall of early industries, evolution of modern industry, effects of partition, industrial policy and progress after independence.
3.	Forms of Industrial Organization: a) Single Proprietorship b) Partnership c) Joint Stock companies d) Cooperatives and e) State Enterprises.
4.	Growth of Industry and Management Meaning of industrial management, functions and tools of management, growth of management concepts.
5.	Objectives of Industrial Management: Defining management objectives, managerial activity and objectives, tests of management of objectives, primary, secondary personal and social objectives of management.
6.	Management Organization: Various forms of organization of departmentalization line staff, functional and committee organization, formal and non formal organization.
7.	Management and Authority, Decision Making in Management
8.	Leadership, Definition, Traits, inborn traits, acquired traits, analytical etc.
9.	Marketing of Industrial Products and the Sales Manager.
10.	Personal Management: Recent changes in personal management function of personal departments, sections, training and placement other functions of personal department.

10. Suggested Books:

1.	**Principles of Management**	**G. R. Terry**
2.	**Industrial Organization & Management**	**Tara Chand**
3.	**Business Organization & Management**	**M. C. Suckla**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code **ECE-805P** **Course Title** **Microwave Engineering LAB [ECE]**

2 Contact Hours

L	-	T	-	P	2

3 Examination Duration (Hrs)

Theory	-	Practical	02

4 Relative Weight age

MSLE	25	ESLE	25

5. Credits

0	1

8th Sem		
	Autumn	Spring

6. Objective **The experimental setups are introduced to and performed by the students to enable them to give optimal performance in professional life.**

7. Pre-requisite **NA.**

8. Total Contact Hours

9. Details of the syllabus:

S.No.	Particulars
1.	To determine the characteristic impedance of lumped constant delay line.
2.	To study the voltage distribution along a lumped constant delay line in the cases when it is: i. Open Circuited ii. Short Circuited iii. Terminated in Z_o and hence determine attenuation constant, phase constant, propagation constant and wavelength.
3.	To study the method of measuring VSWR at the input of the component under test or unknown load when i. VSWR<10 ii. VSWR>10
4.	To set up an LOS link using microwave horn antennas and study the link performance under different obstructions.
5.	To study the method of evaluation of an unknown load impedance by measuring VSWR and the position of voltage minimum
6.	i. To study the characteristic of wave propagation in a waveguide by studying standing wave pattern and hence to plot W.B. diagram. ii. To verify relationship between guide wavelength and free space wavelength
7.	To study the method of measurement of VSWR at the input of the component under test (say pyramidal horn) and hence to determine its input impedance.
8.	To measure the frequency of a microwave source.
9.	To study Gunn oscillator as a source of microwave power and hence to study. i. I-V Characteristics ii. Power frequency characteristics
10.	To measure main line and auxiliary line VSWR of a directional coupler
11.	To study the properties of E and H-plane waveguide tee junctions and to determine isolations, coupling coefficients and input VSWR.

SYLLABUS OF ELECTIVE COURSES

DEPARTEMENT OF ELECTRONICS AND COMMUNICATION

NIT SRINAGAR

List of Electives

Subject Code	Subject Name
ECE-001FE	Embedded Systems
ECE-002FE	Programmable Measurement Techniques
ECE-003FE	VLSI Technology
ECE-004E	Network Synthesis
ECE-005FE	Visual Programming
ELE-702	Advanced Power Electronics
ECE-006E	Analog and Mixed Signal Design
ECE-007E	Nano-electronics
ECE-08FE	Nano-Technology
ECE-009E	RF Design
ECE-010FE	Quantum Devices and Computing
ECE-011E	TV Engineering
ECE-012E	Radar Systems
ECE-013E	System Design
ECE-014E	MM Wave Communication
ECE-015E	Molecular Electronics
ECE-016FE	Optical Communication
ECE-017FE	Optical Devices
ECE-018FE	Computer Networks
ECE-019E	Biomedical and Image Processing
ECE-020E	Advanced Microprocessor
ECE-021E	Telemedicine
ECE-022FE	GIS and Remote Sensing
ECE-023E	Mechatronics
ECE-024FE	Real Time Systems
ECE-025FE	HR Management
ECE-026FE	Technology Management
ECE-027FE	IT in Management
IT-603	Software Engineering
MTH-801E	Optimization Techniques
MTH-602	Discrete Mathematics
MTH-806	Numerical Analysis
PHY-001FE	Technological Development and Ecology

Note: Besides the above Elective Courses the students can take Electives floated by:

- **E & CE Department at M. Tech Level**
- **Electrical Engineering and Computer Science & Engineering at B. Tech Level**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-001FE** **Course Title** **Embedded Systems**

2 Contact Hours

L	2	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Characteristics of Embedding Computing Applications, Concept of Real time Systems, Challenges in Embedded System Design. Design Process.
2.	**Embedded System Architecture:** Instruction Set Architecture - CISC and RISC instruction set architecture, Basic Embedded Processor/Microcontroller Architecture, Memory System Architecture, I/o Sub-system, Co-processors and Hardware Accelerators, Processor Performance Enhancement, CPU Power Consumption.
3.	**Designing Embedded Computing Platform:** Using CPU Bus, Memory Devices and their Characteristics – RAM, ROM, UVROM, EEPROM, Flash Memory, DRAM. I/O Devices. Component Interfacing - Memory Interfacing, I/O Device Interfacing, Interfacing Protocols. Designing with Processors.
4.	**Programming Embedded Systems:** Program Design, Programming Languages - Desired Language Characteristics, Use of High Level Languages, Programming and Run-time Environment, Basic Compilation Techniques, Analysis and Optimization of - Execution Time, Energy and Power, Program Size.
5.	**Operating System:** Basic Features of an Operating System, Kernel Features, Processes and Threads, Context Switching, Scheduling, Inter-process Communication, Real-time Memory Management, I/O, Evaluating and Optimizing Operating system performance, Power Optimization Strategies for Processes.
6.	**Network Fundamentals:** Layers and Protocols, Distributed Embedded Architectures, Elements of Protocol Design, High Level Protocol Design Languages, Network Based Design, Internet-Enabled Systems, Wireless Applications – Bluetooth.

10. Suggested Books

1.	**Network Analysis**	**By M.E. Van Valkenberg**
2.	**Network Analysis and Synthesis**	**By F. F. Kuo**
3.	**Network Analysis and Synthesis**	**By K.M.Soni**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-002FE** **Course Title** **Programmable Measurement Techniques**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective: The course is introduced to the students to enable them to give optimal performance and to tackle every challenge during professional experience.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Digital Time Measurement Techniques:** Measurement of time interval between two events, error in time interval measurement, vernier technique for small time measurement, measurement of time interval with constraints, measurement of periodic time, phase, time interval between two events defined by voltage levels, capacitance, quality factor of ringing circuit, decibel meter, logarithmic A/D converter.
2.	**Digital Frequency Measurement Techniques:** Measurement of frequency, ratio of two frequencies, product of two frequencies, high frequency, average frequency difference, deviation of power frequency, peak frequency. Fast low-frequency measurement.
3.	**Digitally Programmable Circuits:** Resistor, potentiometer, amplifiers, Schmitt trigger, and dual polarity gain amplifiers. Programmable gain amplifier with dual output, two stage programming, programmable bi-quads.
4.	**Digital to Analog Converters:** Output input relation, DACs derived from programmable gain amplifiers, Weighted-resistor DAC, Weighted current DAC, Weighted reference voltage DAC, Ladder DAC, switches.
5.	**Digital Voltage Measurement Techniques:** Sampling theorem, time-division multiplexing, quantization, indirect type A/D converters, direct type A/D converters, Input circuitry of a digital voltmeter.

10. Suggested Books

1.	**Digital Measurement Technique**	**T. S. Rathore**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-003FE** **Course Title** **VLSI Technology**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Crystal Growth, Wafer Preparation, Epitaxy and Oxidation** Electronic Grade Silicon, Czochralski crystal growing, Silicon Shaping, processing consideration, Vapor phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators, Epitaxial Evaluation, Growth Mechanism and kinetics, Thin Oxides, Oxidation Techniques and Systems, Oxide properties, Redistribution of Dopants at interface, Oxidation of Poly Silicon, Oxidation induced Defects.
2.	**Lithography and Relative Plasma Etching** Optical Lithography, Electron Lithography, X-Ray Lithography, Ion Lithography, Plasma properties, Feature Size control and Anisotropic Etch mechanism, relative Plasma Etching techniques and Equipments
3.	**Deposition, Diffusion, Ion Implantation and Metallization** Deposition process, Polysilicon, plasma assisted Deposition, Models of Diffusion in Solids, Flick‟s one dimensional Diffusion Equation – Atomic Diffusion Mechanism –Measurement techniques – Range theory-Implant equipment. Annealing Shallow junction – High energy implantation – Physical vapour deposition – Patterning.
4.	**Process Simulation and VLSI Process Integration** Ion implantation – Diffusion and oxidation – Epitaxy – Lithography – Etching and Deposition- NMOS IC Technology – CMOS IC Technology – MOS Memory IC technology - Bipolar IC Technology – IC Fabrication.
5.	**Assembly Techniques and packaging of VLSI Devices** Analytical Beams – Beams Specimen interactions - Chemical methods – Package types – banking design consideration – VLSI assembly technology – Package fabrication technology.

10. Suggested Books

1.	**VLSI Technology**	**S.M.Sze**
2.	**Introduction to Microelectronics Fabrication**	**Richard Jaegar**
3.	**Basic VLSI Design**	**Douglas A. Pucknell and Kamran Eshraghian**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-004E** **Course Title** **Network Synthesis**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Frequency domain representation of networks, Laplace transform of shifted functions, transient & steady response. Time domain behaviors from poles and zeros. Convolution Theorem.
2.	**Network Synthesis:** Network functions, Impedance & Admittance function, Transfer functions, Relationship between transfer and impulse response, poles and zeros and restrictions, Network function for two terminal pair network.
3.	**Poles and Zeros:** Sinusoidal network in terms of poles & zeros. Real liability condition for impedance synthesis of RL & RC circuits. Network synthesis techniques for 2-terminal network, Foster and Cauer forms.
4.	**Filters Synthesis:** Classification of filters, characteristics impedance and propagation constant of pure reactive network, Ladder network, T section, IT section, terminating half section. Pass bands and stop bands. Design of constant-K, m-derived filters. Composite filters.

10. Suggested Books

1.	**Network Analysis & Synthesis**	**Van Valkenberg**
2.	**Network Synthesis**	**IVS Iyer**
3.	**Electric Circuits**	**JA Administer**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-005FE** **Course Title** **Visual Programming**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Windows concepts and terminology:** key elements, Creating the look, communication via messages, windows resources and functions, adding multimedia and sound resources, Writing windows applications, taking control of windows, adding menus, dialog boxes, Special controls. Concepts of X-Windows System & programming. Introduction to Visual Basic & difference with BASIC. Concept about form Project, Application, Tools, Toolbox, Controls & Properties. Idea about Labels, Buttons, Text Boxes. Data basics, Different type variables & their use in VB, sub-functions & Procedure details, Input box () & Msgbox (). Making decisions, looping List boxes & Data lists, List Box control, Combo Boxes, data Arrays. Frames, buttons, check boxes, timer control, Programming with data, built in functions, ODBC data base connectivity. Data form Wizard, query, and menus in VB Applications, Graphics.
2.	**Dynamic Web Pages:** The need of dynamic web pages; an overview of DHTML, cascading style sheet (css), comparative studies of different technologies of dynamic page creation
3.	**Active Web Pages:** Need of active web pages; java applet life cycle.
4.	**Java Script:** Data types, variables, operators, conditional statements, array object, date object, string object.
5.	**Java Servlet:** Servlet environment and role, HTML support, Servlet API, The servlet life cycle, Cookies and Sessions.
6.	**JSP:** JSP architecture, JSP servers, JSP tags, understanding the layout in JSP, Declaring variables, methods in JSP, inserting java expression in JSP, processing request from user and generating dynamic response for the user, inserting applets and java beans into JSP, using include and forward action, comparing JSP and CGI program, comparing JSP and ASP program; Creating ODBC data source name, introduction to JDBC, prepared statement and callable statement.
7.	**J2EE:** An overview of J2EE web services, basics of Enterprise Java Beans, EJB vs. Java Beans, basics of RMI, JNI.

10. Suggested Books

1.	**Visual Basic 6 from the Ground Up**	**Cornell, TMH**
2.	**Visual Basic 6**	**CDG, TMH**
3.	**Win32 API Programming with VB**	**Roman,SPD/O'REILLY**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ELE-702** **Course Title** **Advanced Power Electronics**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**	
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**			
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**4**					

6. Objective: The course is introduced to the students to enable them to give optimal performance andto tackle every challenge during professional experience.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Module-I:** a) Modern solid-state power semi-conducting devices: Power MOSFET,IGBT, GTO, IGCT, etc. b) Power Modules, Intelligent power modules, Gating circuits, Their control through digital signal processors.
2.	**Module - II:** a) Non-isolated DC-DC converters: Buck, Boost, Buck-Boost, Cuk, SEPIC,ZETA converters in DCM and CCM. b) Isolated DC-DC converters: Flyback, Forward, Cuk, SEPIC, ZETA, Push-Pull, Half-Bridge and Full-Bridge converters in DCM and CCM. c)Self power factor correction (PFC) properties of DC-DC converters at the mains of single-phase, single-stage AC/DC converters. d) Applications in SMPS, UPS, Welding and Lighting systems.
3.	**Module-III:** a) Single-phase Improved Power Quality AC/DC Converters: Buck, Boost, Buck-Boost, PWM VSC, PWM CSC, Multi-level converters. b) Three-phase Improved Power Quality AC/DC Converters, VSC, CSC, Multi-phase converter, Multi-pulse converters. c) Multi-level converters
4.	**Module-IV:** Power Quality mitigation apparatus: a) Passive filters, Active Power Filters (APFs) and Hybrid filters b) DTSTCOM (Distribution Static Compensator), DVR (Dynamic Voltage Restorer) and UPQC (Unified Power Quality Conditioner).
5.	**Module-V:** FACTS Devices: TCR(Thyristor Controlled Reactor), TSC (Thyristor Switched Capacitor), STATCOM (Static Synchronous Compensator), SSSC (Static Series Synchronous Compensator), UPFC (Unified Power Flow Controller) and IPFC (Interline Power Flow Controller).
6.	**Module-VI:** HVDC systems: Evolution of HVDC system, Comparison of HVDC and HVAC systems, 12-pulse converter-based HVDC system, Analysis of HVDC converters, HVDC system control features, Smoothing reactor and DC lines, Reactive power requirements, Harmonic analysis, Filter design, Converter mal-operation like misfiring and commutation failure.
7.	**Module-VII:** Various applications of Power Electronics in residential, commercial and industrial environments, Energy conservation (some typical examples),Inter-disciplinary nature of Power Electronics, Solid state controllers for motor drives.

10. Suggested Books

1.	**Power Electronics Converters: Applications, and Design**	**Mohan, Undeland,Robbins. Wiley Indian Edition (3/e)**
2.	**Power Electronics**	**M. H. Rashid. Academic Press**
3.	**Power Electronics and Motor Drives: Advances and Trends**	**Bimal K. Bose**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-006E** **Course Title** **Analog and Mixed Signal Design**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**	
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**			
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**3**					

6. Objective: The course is to introduce the students with advanced electronic circuits and the types of operations on various types of signals.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Introduction to analog VLSI and mixed signal issues in CMOS technologies. Basic MOS models, SPICE Models and frequency dependent parameters. Basic NMOS/CMOS gain stage, cascade and cascode circuits.Frequency response, stability and noise issues in amplifiers.
2.	**CMOS analog blocks:** Current Sources and Voltage references. Differential amplifier and OP-AMP design. Frequency Synthesizers, Voltage Controlled Oscillators and Phased lock-loop.
3.	**Non-linear analog blocks:** Comparators, Charge-pump circuits and Multipliers. Data converters. Analog Interconnects. Analog Testing and Layout issues. Low Voltage and Low Power Circuits.
4.	**Data Convertor Architectures:** Data Converter Fundamentals, DAC & ADC specifications, Mixed Signal Layout issues, DAC Architectures, ADCArchitectures. Introduction to RF Electronics. Basic concepts in RF design.

10. Suggested Books

1.	**CMOS Circuits Design, Layout and Simulation**	**Baker, Li, Boyce**
2.	**Analog Integrated Circuit Design**	**David A.Johns,Ken Martin**
3.	**Design of Analog CMOS Circuits**	**B.Razavi**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-007E** **Course Title** **Nanoelectronics**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**3**

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Recent past, the present and its challenges, Future, Overview of basic Nano electronics.
2.	**Nano electronics & Nanocomputer architectures:** Introduction to Nanocomputers, Nanocomputer Architecture, Quantum DOT cellular Automata (QCA), QCA circuits, Single electron circuits, molecular circuits, Logic switches – Interface engineering – Properties (Self-organization, Size-dependent) – Limitations.
3.	**Nanoelectronic Architectures:** Nanofabrication – Nanopatterning of Metallic/Semiconducting nanostructures (e-beam/X-ray, Optical lithography, STM/AFM- SEM & Soft-lithography) – Nano phase materials – Self-assembled Inorganic/Organic layers.
4.	**Spintronics:** Introduction, Overview, History & Background, Generation of Spin Polarization Theories of spin Injection, spin relaxation and spin dephasing, Spintronic devices and applications, spin filters, spin diodes, spin transistors.
5.	**Memory Devices And Sensors:** Memory devices and sensors – Nano ferroelectrics – Ferroelectric random access memory –Fe-RAM circuit design –ferroelectric thin film properties and integration – calorimetric -sensors – electrochemical cells – surface and bulk acoustic devices – gas sensitive FETs – resistive semiconductor gas sensors –electronic noses – identification of hazardous solvents and gases – semiconductor sensor array.

10. Suggested Books

1.	**Nanoelectronics & Nanosystems: From Transistor to Molecular & Quantum Device**	**Karl Goser, JanDienstuhl**
2.	**Nano Electronics and Information Technology**	**Rainer Waser**
3.	**Concepts in Spintronics**	**Sadamichi Maekawa**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-008E** **Course Title** **Nano Technology**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**	
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**			
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**3**					

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction** Introduction to nanoscale science and technology, why nanoscience and nanotechnology? Length energy and time scales, nanostructure types and properties, electronic and optical properties of materials, top down approach to nanolithography. Spatial resolution of optical, deep ultraviolet, X-ray, electron beam and ion beam lithography.
2.	**Quantum Mechanics** Band gap engineering, Quantum confinement of electrons in semiconductor nano structures, One dimensional confinement (Quantum wires), Two dimensional confinement (Quantum wells), three dimensional confinement (Quantum dots) and Bottom up approach, Single electron transistors, coulomb blockade effects in ultra small metallic tunnel junctions.
3.	**Molecular Techniques** Molecular Electronics, Chemical self-assembly, carbon fullerenes and nano tubes, Self assembled mono layers, Applications in biological and chemical detection.
4.	**Surface analytical instrumentation techniques for nanotechnology** Atomic scale characterization techniques, scanning probe microscopy, scanning tunneling microscopy and atomic force microscopy

10. Suggested Books

1.	**Quantum Transport in Semiconductor Nanostructures in Solid state Physics**	**Beenaker and Van Houten**
2.	**Transport in Nano structures**	**David Ferry**
3.	**Introduction to Mesoscopic Physics**	**Y. Imry**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-009E** **Course Title** **RF Design**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective: This course will develop electronic circuits for radio frequency applications, specific to CMOS integrated circuits. As the course title suggests, the course will be specific to CMOS integrated circuits, and specific to radio frequencies. In particular, the course will focus on circuits for radio front-ends for mobile phone handsets. The course will cover low noise amplifiers, mixers, power amplifiers, frequency synthesizers (and phase locked loops). The course will also cover several modern radio architectures.

7. Pre-requisite: **Analog integrated circuits.**

8. Total Contact Hours: **~ 35-40.**

9. Details of the syllabus:

S. No.	Particulars
1.	**Introduction:** RF systems – basic architectures, Transmission media and reflections, Maximum power transfer. Passive RLC Networks: Parallel RLC tank, Q, Pi match, T match. Passive IC Components: Interconnects and skin effect, Resistors, capacitors, Inductors. MOS device review.
2.	**Distributed Systems:** Transmission lines, reflection coefficient, The wave equation, Lossy transmission lines, Smith charts – plotting gamma.
3.	**System Design:** Bandwidth estimation using open-circuit time constants, Bandwidth estimation using short-circuit time constants, Rise time, delay and bandwidth, Zeros to enhance bandwidth, Shunt-series amplifiers, tuned amplifiers, and Cascaded amplifiers. Noise, Noise Figure, Intrinsic MOS noise parameters, Power match versus noise match, Large signal performance. Mixer Design.
4.	**RF Power Amplifiers, VCO and Phase Locked Loops:** Class A, AB, B, C, D, E, F amplifiers, RF Power amplifier design examples. Resonators, Negative resistance oscillators. Linearized PLL models, Phase detectors, charge pumps, Loop filters, PLL design examples.
5.	**Frequency synthesis and oscillators:** Frequency division, integer-N synthesis, Fractional frequency synthesis. Phase noise - General considerations, Circuit examples.
6.	**Radio architectures:** GSM radio architectures, CDMA, UMTS radio architectures.

10. Suggested Books

1.	**The Design of CMOS Radio-Frequency Integrated Circuits**	**Thomas H. Lee. Cambridge University Press, 2004.**
2.	**RF Microelectronics**	**Behzad Razavi, Prentice Hall, 1997.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-010FE** **Course Title** **Quantum Devices and Computing**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**		
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**				
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**3**						

6. Objective: This course will develop the subject of quantum computation and quantum information from the basics. Quantum algorithms, quantum cryptography, quantum error correction and aspects of quantum entanglement theory will be covered.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Introducing quantum mechanics. Quantum kinematics, quantum dynamics, quantum measurements.Singlequbit, multiqubits, gates. Density operators, pure and mixed states, quantum operations, environmental effect, decoherence. Quantum no-cloning, quantum teleportation.
2.	**Quantum Cryptography:** Cryptography, classical cryptography, introduction to quantum cryptography. BB84, B92 protocols. Introduction to security proofs for these protocols.
3.	**Quantum Algorithm:** Introduction to quantum algorithms. Deutsch-Jozsa algorithm, Grover's quantum search algorithm, Simon's algorithm. Shor's quantum factorization algorithm.
4.	**Error Correction**: Errors and correction for errors. Simple examples of error correcting codes in classical computation. Linear codes. Quantum error correction and simple examples. Shor code.
5.	**Quantum Entanglement**: Quantum correlations, Bell's inequalities, EPR paradox. Theory of quantum entanglement. Entanglement of pure bipartite states.Entanglement of mixed states. Peres partial transpose criterion. NPT and PPT states, bound entanglement, entanglement witnesses.
6.	**Implementations**: Different implementations of quantum computers. NMR and ensemble quantum computing, Ion trap implementations. Optical implementations.

10. Suggested Books

1.	**Quantum Computation and Quantum Information**	**M.A. Nielsen and I.L.Chuang**
2.	**Quantum Computing**	**Lov K Grover, Vishal Sahni**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-011E** **Course Title** **TV Engineering**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**	
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**			
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**3**					

6. Objective

- To study the analysis and synthesis of TV Pictures, Composite Video Signal, Receiver Picture Tubes and Television Camera Tubes
- To study the principles of Monochrome Television Transmitter and Receiver systems.
- To study the various Color Television systems with a greater emphasis on PAL system.
- To study the advanced topics in Television systems and Video Engineering

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**FUNDAMENTALS OF TELEVISION:** Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission – standard channel bandwidth.
2.	**MONOCHROME TELEVISION TRANSMITTER AND RECEIVER:** TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.
3.	**ESSENTIALS OF COLOUR TELEVISION:** Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.
4.	**COLOUR TELEVISION SYSTEMS:** NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator – ACC amplifier- Reference Oscillator- Ident and colour killer

	circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.
5.	**ADVANCED TELEVISION SYSTEMS:** Satellite TV technology- Cable TV – VCR- Video Disc recording and playback- Tele Text broadcast receiver – digital television – Transmission and reception- projection Television – Flat panel display TV receiver – Sterio sound in TV – 3D TV – EDTV – Digital equipments for TV studios.

10. Suggested Books

1.	**Monochrome Television Practice, Principles, Technology and servicing**	**By R.R.Gulati**
2.	**Monochrome and colour Television**	**By R.R.Gulati**
3.	**Colour Television, Theory and Practice**	**By S.P.Bali**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-012E** **Course Title** **Radar Systems**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**3**

6. Objective

7. Pre-requisite **Antennas, EM Waves.**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Nature of Radar, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems.
2.	**Radar Equation :** Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment).
3.	**CW and Frequency Modulated Radar :** Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.
4.	**MTI and Pulse Doppler Radar:** Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar.
5.	**Tracking Radar:** Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range, Acquisition and Scanning Patterns. Comparison of Trackers.
6.	**Detection of Radar Signals in Noise:** Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.
7.	**Radar Receivers**: Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

10. Suggested Books

1.	**Introduction to Radar Systems**	**By Merrill I. Skolnik**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-013E** **Course Title** **System Design**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Module I:** Basics of system hardware design. Hierarchical design using top-down and bottom-up methodology.
2.	**Module II:** System partitioning techniques, interfacing between system components. Handling multiple clock domains, Synchronous and asynchronous design styles. Interface between synchronous and asynchronous blocks. Meta-stability and techniques for handling it. Interfacing linear and digital systems, data conversion circuits.
3.	**Module III:** Design of finite state machines, state assignment strategies. Design and optimization of pipelined stages. Use of data flow graphs, Critical path analysis, retiming and scheduling strategies for performance enhancement. Implementation of DSP algorithms.Signal integrity and high speed behaviour of interconnects: ringing, cross talk and ground bounce.
4.	**Module IV:** Layout strategies at IC and board level for local and global signals.Power supply decoupling.

10. Suggested Books

1.	**System Analysis & Design**	**V K Jain**
2.	**Modern Systems Analysis and Design**	**Jeffrey A. Hoffer**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code	**ECE-014E**	**Course Title**	**MM Wave Communication**						
2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**			
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**					
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**	
5. Credits	**0**	**3**							

6. Objective: The course is introduced to the students to enable them to understand the modulation techniques in MillimeterWave Communication and to introduce them to millimeter wave antennas and beam forming/beam steering concepts.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Multi-Gigabit 60-Ghz Millimeter Wave Radios:** Millimeter wave characteristics-Channel performance at 60GHz, Gigabit wireless communication, Standards- WiGig,IEEE 802.11ad,IEEE 802.15.3c,WirelessHD,ECMA-387/ISO/IEC 13156,Coexistence with wireless backhaul, Millimeter wave applications- WLAN, WPAN, Outdoor point to point.
2.	**Millimeter Wave Antennas:** Path loss and antenna directivity, Antenna beamwidth, Maximum possible gain to Q, Polarization, Beam steering antenna, Millimetre wave design consideration.
3.	**Millimeter Wave Transceivers:** Millimeter wave link budget, Transceiver architecture, Receiver without local oscillator, Millimeter wave calibration, Modulationtechniques-OOK, PSK, FSK, QAM, OFDM.
4.	**ADVANCED BEAM STEERING AND BEAM FORMING:** Need for beam steering and beam forming, Adaptive frame structure-Advanced beam steering technology, advanced beam forming technology, Advanced antenna ID technology.
5.	**Millimeter Wave MIMO:** Spatial diversity of antenna arrays, Multiple antennas, Multiple transceivers, Noise coupling in MIMO system.

10. Suggested Books

1.	**Millimeter wave communication systems**	**Kao-Cheng Huang, Zhaocheng Wang,**
2.	**Multi-Gigabit Microwave and Millimeter-Wave Wireless Communications**	**Jonathan Wells**
3.	**60GHz Technology for Gbps WLAN and WPAN: From Theory to Practice**	**Su-Khiong Yong, Pengfei Xia and Alberto Valdes-Garcia,**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-015E** **Course Title** **Molecular Electronics**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** The Birth of Molecular Electronics, Fabrication of Metallic Atomic-Size Contacts, Contacting Single Molecules: Experimental Techniques, The Scattering Approach to Phase-Coherent Transport in Nanocontacts.
2.	**Green's Function:** Introduction to Green's Function Techniques for Systems in Equilibrium, Green's Functions and Feynman Diagrams, Nonequilibrium Green's Functions Formalism.
3.	**Electrical Properties: Formulas of the Electrical Current, Exploiting the Keldysh Formalism Electronic Structure I: Tight-Binding Approach, Electronic Structure II: Density Functional Theory, The Conductance of a Single Atom, Spin-Dependent Transport in Ferromagnetic Atomic Contacts, Coherent Transport Through Molecular Junctions I: Basic Concepts, Coherent Transport Through Molecular Junctions II: Test-Bed Molecules.**
4.	**Single-Molecule Transistors:** Coulomb Blockade and Kondo Physics, Vibrationally-Induced Inelastic Current I: Experiment, Vibrationally-Induced Inelastic Current II: Theory, The Hopping Regime and Transport Through DNA Molecules
5.	**Beyond Electrical Conductance: Short Noise and Thermal Transport, Optical Properties of Current-Carrying Molecular Junctions**

10. Suggested Books

1.	**Molecular Electronics: An Introduction to Theory and Experiment**	**Juan Carlos Cuevas**
2.	**Electronics in Molecules**	**Jean Pierre and Michel Verdaguer**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-016FE** **Course Title** **Optical Communications**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6. Objective:

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
  To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**INTRODUCTION TO OPTICAL FIBERS:** Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations -Mode theory of Circular Wave guides-Overview of Modes-Key Modal concepts- Linearly Polarized Modes - Single Mode Fibers-Graded Index fiber structure.
2.	**SIGNAL DEGRADATION OPTICAL FIBERS**: Attenuation - Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination - Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling -Design Optimization of SM fibers-RI profile and cut-off wavelength.
3.	**FIBER OPTICAL SOURCES AND COUPLING:** Direct and indirect Band gap materials-LED structures -Light source materials - Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition -Rate equations -External Quantum efficiency -Resonant frequencies -Laser Diodes, Temperature effects, Introduction to Quantum laser, Fiber amplifiers- Power Launching and coupling, Lencing schemes, Fibre – to - Fibre joints, Fibre splicing.
4.	**FIBER OPTICAL RECEIVERS**: PIN and APD diodes -Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise -Comparison of Photo detectors -Fundamental Receiver Operation - preamplifiers, Error Sources -Receiver Configuration -Probability of Error - Quantum Limit.
5.	**DIGITAL TRANSMISSION SYSTEM:** Point-to-Point links System considerations -Link Power budget -Rise - time budget -Noise Effects on System Performance-Operational Principles of WDM, Solitons-Erbium-doped Amplifiers. Basic on concepts of SONET/SDH Network.

10. Suggested Books

1.	**Optical Fiber Communication**	**By Gerd Keiser**
2.	**Optical Communication, Principles and Practice**	**By J.Senior**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-017FE** **Course Title** **Optical Devices**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**3**

6. Objective: The treatment would look at semiconductor devices that are commonly used in optical fiber communications.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction**: Historical development of Optical Communications, Modulation and Bandwidth in Optical Communications, Optical Communication Capacity - DWDM and CWDM, Present Technology and future trends.
2.	**Semiconductor Optical Waveguides:** Refractive Index in semiconductor materials, Review of electromagnetic theory, Laws of reflection and refraction - Critical Angle, Brewster's angle, and power flow, Electromagnetic approach to Symmetric and Asymmetric Slab-waveguides - transverse modes and propagation, Two Dimensional waveguides. Effective Index and other techniques for the design and analysis of single mode Rib-, Ridge-, Buried-, etc. waveguides.
3.	**Review of Semiconductors**: Band structure, Direct and Indirect Transitions, Density of States, Spontaneous and Stimulated Recombination, Probability and rates of optical transitions, P-N junctions, Heterojunctions, Carrier injection and Quasi Fermi energy, Carrier mobility and velocity saturation.
4.	**Epitaxial Growth of Semiconductors:** LPE, MBE, and MOCVD growth systems, Growth of DH structures, Growth of Quantum Wells, Strained Layers and Strained Quantum Wells, Quantum Dots and Dashes.
5.	**LED**: Spontaneous emission spectrum - Gaussian approximation. Current - Output Power dependence and Peak Emission wavelength. Surface and Edge emitting LEDs. Efficiency Calculation of LEDs. Emission Intensity Pattern of LEDs. Superluminescent LEDs. Modulation Bandwidth and Temperature dependence of LED power and wavelength.
6.	**Diode Lasers:** Gain, Fabry-Perrot Cavity. Longitudinal modes of a semiconductor Laser. Calculation of Threshold Current and Linewidth, Output power dependence on Current. Near and Far-field pattern. Types of semiconductor diode lasers. Fabrication of Laser Diodes. Photon lifetime. Power conversion efficiency and Differential Gain. Modulation Bandwidth of FP-Lasers - Lasing Spectrum and dynamic Broadening. Characteristic temperature of lasers. Tunability of Semiconductor lasers. Quantum Well and Quantum Dot lasers. Noise in semiconductor lasers.
7.	**Single mode Laser diodes**: C-cube laser, Distributed Bragg reflector, DBR Lasers. DFB Lasers - Fabrication and analysis, Tuning of DFB lasers. Vertical Cavity Lasers - Fabrication and analysis. Tuning of VCSELs, External cavity Lasers. Injection Locking, Saturable absorber.
8.	**Detectors:** Photon Absorption and Excess carrier generation-choice of semiconductor. Photoconductors and MSM detectors. PIN Photodiodes. Heterostructure and Quantum Well photodiodes. Efficiency and Responsivity calculation of Photodiodes. Temporal response of PIN photodiodes. Noise and NEP. Carrier Multiplication and Avalanche Photodiodes (APDs) and its NEP. Gain-Bandwidth product. SAM APD. Resonant Photodiodes. Waveguide Photodiodes. Gated Photon counting.
9.	**Packaging**: Packaging and driving of LEDs, Different packages of Diode lasers, Fiber coupled Laser Diodes and Photodiodes.

10.	**Photonic Integrated Circuits:** Optical Amplifiers, Electro-optic effect and phase shifters - bulk and quantized structures, Machzehnder Modulator, External modulation of semiconductor lasers, Coplanar and Vertical couplers. Grating assisted couplers. Ring cavity couplers for add-drop. Photodiode-Amplifier Integration.

10. Suggested Books

1.	**Guided Wave Photonics**	**A. B. Buckman, HBJ Saunders publisher.**
2.	**Semiconductor Optoelectronic Devices**	**P. K. Bhattacharya, Prentice Hall publishers.**
3.	**Optical Fiber Communications**	**J. M. Senior, Prentice Hall publishers.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-018FE Course Title Computer Networks

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction of Network Model:** Principal of computer Network, Internet, protocols and standards, network models, layered task, internet model, peer-peer processes, functions of layers, OSI model and TCP/IP model.
2.	**Physical Layer:** Transmission modes, DTE-DCE Interface, Modems, Guided media, Unguided media, Performance, Multiplexing, Switching, DSL, FTTC.
3.	**Data Link Layer:** Data Link Control - Line discipline, Flow control, Error control; Data Link protocols – Asynchronous Protocols, Synchronous protocols, Character oriented protocols, Bit oriented protocols, Link Access Procedures
4.	**LANS and MANS:** Project 802, Ethernet, Token Bus, Token Ring, FDDI, Fast Ethernet, Gigabit Ethernet, DQDB, SMDS, PPP.
5.	**Network Layer:** Repeaters, Bridges, Hubs, Switches, Routers, Gateways, Routing algorithms - Shortest path routing, Distance vector routing, Link state routing; X.25 layers and protocols, Congestion control - Leaky bucket algorithm, TCP/IP Protocol Suite- IP protocol, IP addresses, Subnetting, ARP, RARP; ICMP, ISDN Services and channels, Broadband ISDN, ATM- Design goals, architecture and layers.
6.	**Transport Layer:** Duties of Transport layer, Transport connection, OSI Transport protocol, TCP, UDP.
7.	**Application Layer:** BOOTP and DHCP, DNS, TELNET, FTP, SMTP, HTTP, WWW, VoIP, Four aspects of Network security, Privacy, Digital Signatures.

10. Suggested Books

1.	**Data Communications and Networking**	**Forouzan, 4th edition, McGraw Hill, 2007**
2.	**Data and Computer Communications**	**W. Stallings, 8th edition, Prentice Hall, 2007**
3.	**Computer Networks**	**S. Tanenbaum, 4th edition, Prentice Hall, 2003**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-019E** **Course Title** **Biomedical and Image Processing**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective Basic objective of this subject is to give students an overview of basic signal processing techniques in analyzing biological signals

7. Pre-requisite

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Fundamentals of Signal Processing:** Sampling and aliasing, Signal reconstruction, Signal conversion systems, Circular convolution Correlation- Autocorrelation – Cross correlation, FFT-decimation in time algorithm, Decimation in Frequency algorithm.
2.	**Digital Filter Design:** Basics of filter, Design of IR filter-impulse invariant method – Bilinear Transformation Method Warping and pre-warping effect, Frequency transformation, Characteristics of FIR filter, FIR filter design using windowing techniques- Rectangular window – Hamming window – Hanning window.
3.	**Wavelet and Speech Processing: Introduction to wavelets, Time frequency representation, Discrete wavelet transform, pyramid algorithm, Comparison of Fourier transform and wavelet transform, Speech analysis – Cepstrum – Homomorphic filtering of speech signals, EG signal characteristics – EEG analysis.**
4.	**Analysis of Bio-signals:** Automatic analysis and classification of ECG, P-wave detection, QRS complex detection, Correlation analysis of ECG signals, Signal averaged ECG, Analysis of Heart Rate variability, Synchronized averaging of PCG envelopes, envelogram, Analysis of PCG signal, Analysis of EMG signal.
5.	**Introduction to Human vision and perception:** Image enhancement, feature detection.

10. Suggested Books

1.	**Digital Signal Processing, Algorithms and Applications**	**John G, Proakis and Dimitris Manolakis G**
2.	**Biomedical signal processing**	**Rangaraj M Rangayan**
3.	**Biomedical Signal Processing: Principles and Techniques**	**Reddy D.C**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-020E** **Course Title** **Advanced Microprocessor**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6. Objective: The course is introduced to the students to enable them to introduce with 8086 microprocessor and some other latest microprocessors

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Pin configuration, Architecture, Memory and I/O space of 8086 microprocessor. Addressing modes and Instruction set.
2.	**Interfacing:** Introduction to assembly language of 8086 microprocessor and example programs. Input/output processor, Interfacing of memories, I/O operations.
3.	**Controllers:** Programmable interrupt controller, Programmable communication interface, Programmable Keyboard/Display interface. Floppy disk controller, DMA controller, USART controller, Pointer Controllers, etc.
4.	**Advanced Microprocessors:** Introduction to 8088 and Pentium series.

10. Suggested Books

1.	**Advanced Microprocessors and Peripherals**	**Ray Ajoy**
2.	**Advanced Microprocessors**	**G. T. Manohar, Pearson Education**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

1 Subject Code ECE-021E Course Title Telemedicine

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**History of Telemedicine:** Telemedicine: Definition and history, Block diagram, Scope, Benefits, Limitations and Clinical applications - Real-time and store-forward, Types of information: Audio, Video, Still Images, Text and data, and Fax - Types of Communication and Network: PSTN, POTS, ATN, and ISDN - Basic concepts of Communication and Network: Internet, and Wireless communications (GSM, Satellite and Micro- wave), Types of antennas depending on requirements.
2.	**Medical Data Security and Legal Issues:** Data Exchanges: Network configuration, Video conferencing- Data security and Standards: Encryption, Cryptography, Mechanisms and phases of encryption- Protocols and Standards -encryption, Ethical and legal aspects of Telemedicine, patient rights and consent form, aces to medical records, Intelectual property rights.
3.	**Tele-Radiology and Tele-Pathology: Tele-radiology and its basic system components, Image acquisition system, Display system, Communication networks, Interpretation, Tele-pathology, Multimedia databases, color images of sufficient resolution, image compression methods, Interactive control of color and controlled sampling.**
4.	**Other Medical Applications:** Tele-dermatology, Tele-psychiatry, Tele-cardiology, Tele-trauma, role of tele-education, evaluation in telemedicine, Tele-oncology, Tele-surgery, security and confidentiality tools.

10. Suggested Books

1.	**Handbook of Telemedicine**	**Olga Ferrer-Roca, M.Sosa Ludicissa**
2.	**Essentials of Telemedicine and Telecare**	**Norris A.C**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-022FE** **Course Title** **GIS and Remote Sensing**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Physics of Remote Sensing:** Sources of Energy, Spectral reflectance of Earth's surface features.
2.	**Data Acquisition:** Platforms - LANDSAT, SPOT, IRS, ERS, INSAT and other platforms; Data Acquisition Sensors - Visible, Infrared and Thermal sensors. Data Analysis, Data Pre-processing, Basic Principles of Visual Interpretation; Microwave Remote Sensing; Applications.
3.	**GEOGRAPHICAL INFORMATION SYSTEMS:** Mapping concepts, Computer Automated Cartography, Fundamentals of GIS, GIS Software's Topology, Spatial Analysis and Modeling Integration with Remote Sensing data - GIS Project Planning and Implementation.
4.	**PHOTOGRAMMETRY:** Aerial Photography Systems, Historical development, Classification, Stereoscopy-stereoscopic plotting instruments, Concepts of orientation, Photomaps and Photo Mosaics and Ortho photos, Project Planning and Aerial Photo Interpretation, image interpretation, Close Range Photogrammetry.

10. Suggested Books

1.	**Remote Sensing and Image Interpretation**	**Lillesand, T.M and Kiefer**
2.	**Principles of GIS for Land Resource Assessment**	**Burrough, P.A**
3.	**Introduction to the Physics and Techniques of Remote Sensing**	**Charles, Elachi, Jakob van Zyl**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-023E** **Course Title** **Mechatronics**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	4

6. Objective After studying this subject students should be able to model, analyze and control engineering systems, identify sensors, transducers and actuators to monitor and control the behavior of a process or product, develop PLC programs for a given task, evaluate the performance of mechatronic systems.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Overview of the course, Examination and Evaluation patterns, History of Mechatronics, Scope and Significance of Mechatronics systems, elements of mechatronic systems, needs and benefits of mechatronics in manufacturing.
2.	**Sensors:** classification of sensors basic working principles, Displacement Sensor - Linear and rotary potentiometers, LVDT and RVDT, incremental and absolute encoders. Strain gauges. Force/Torque – Load cells. Temperature – Thermocouple, Bimetallic Strips, Thermistor, RTD. Accelerometers, Velocity sensors – Tachometers, Proximity and Range sensors – Eddy current sensor, ultrasonic sensor, laser interferometer transducer, Hall Effect sensor, inductive proximity switch. Light sensors – Photodiodes, phototransistors, Flow sensors – Ultrasonic sensor, laser Doppler anemometer tactile sensors – PVDF tactile sensor, micro-switch and reed switch Piezoelectric sensors, vision sensor.
3.	**Actuators:** Electrical Actuators : Solenoids, relays, diodes, thyristors, triacs, BJT, FET, DC motor, Servo motor, BLDC Motor, AC Motor, stepper motors. Hydraulic & Pneumatic devices – Power supplies, valves, cylinder sequencing. Design of Hydraulic & Pneumatic circuits. Piezoelectric actuators, Shape memory alloys.
4.	**Basic System Models & Analysis:** Modelling of one and two degrees of freedom Mechanical, Electrical, Fluid and thermal systems, Block diagram representations for these systems.
5.	**PLC Programming:** PLC Principles of operation PLC sizes PLC hardware components I/O section Analog I/O section Analog I/O modules, digital I/O modules CPU Processor memory module Programming. Ladder Programming, ladder diagrams, timers, internal relays and counters, data handling, analogue input and output. Application on real time industrial automation systems.
6.	**Case Studies of Mechatronic Systems:** Pick and place robot, Bar code, Engine Management system, Washing machine etc.

10. Suggested Books

1.	**Mechatronics**	**W. Bolton**
2.	**Mechatronics System Design**	**Devdas Shetty & Richard Kolk**
3.	**Introduction to Mechatronics and Measurement systems**	**Alciatore David G & Histand Michael B**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-024FE** **Course Title** **Real Time Systems**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective

After studying this subject students should be able to recognize the need for Real-Time Systems, understand the architecture of Real-Time Operating Systems (RTOS), identify the use of Task Management in Real-Time Operating Systems, outline the importance of RT Software Implementation, evaluate System Performance Analysis of RTOS.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Real Time Systems:** Concepts and Misconceptions- Definitions for Real-Time Systems, Usual Misconceptions, Multidisciplinary Design Challenges- Influencing Disciplines, Birth and Evolution of Real-Time Systems-Diversifying Applications, Advancements behind Modern Real-Time Systems.
2.	**Real Time Operating Systems (RTOS) Architecture:** Introduction, Defining an RTOS, Board Support Package, Kernel- Monolithic kernel, Microkernel, Exokernel, The Scheduler-Schedulable Entities, Multitasking, The Context Switch, The Dispatcher, Scheduling Algorithms-Preemptive Priority-Based Scheduling, Round-Robin Scheduling, Objects, Services, Key Characteristics of an RTOS.
3.	**Task Management:** Introduction to Task Management, Task Object, Defining a Task, Task States and Scheduling, Typical Task Operations, Typical Task Structure. Task synchronization-Event Objects, Semaphores-Introduction, Defining Semaphores, Typical Semaphore Operations, Typical Semaphore Use, Inter task communication -Message queues-Introduction, Defining Message Queues, Message Queue States, Message Queue Content, Message Queue Storage, Typical Message Queue Operations, Typical Message Queue Use, Pipes, Timers and system clock-Introduction, Real-Time Clocks and System Clocks, Programmable Interval Timers, Timer Interrupt Service Routines, A Model for Implementing the Soft-Timer Handling Facility.
4.	**RT Software Implementation:** Qualities of Real-Time Software, Software Engineering Principles, Procedural Design Approach, Object-Oriented Design Approach
5.	**RT System Performance Analysis:** Real-Time Performance Analysis-Theoretical Preliminaries, Arguments Related to Parallelization, Execution Time Estimation from Program Code, Analysis of Polled - Loop and Coroutine Systems, Analysis of Round - Robin Systems, Analysis of Fixed - Period Systems, Input/output Performance, Analysis of Memory Requirements- Memory Utilization Analysis, Optimizing Memory Usage.

10. Suggested Books

1.	**Real-Time Concepts For Embedded Systems**	**Qing Li & Caroline Yao**
2.	**Real-Time Systems Design And Analysis Tools for The Practitioner**	**Phillip A. Laplante, Seppo J. Ovaska**
3.	**Embedded Real-Time Systems: Concepts, Design and Programming**	**K.V.K.K.Prasad**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-025FE** **Course Title** **H.R.Management**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Basic Concept of Organization:** definition of organization and organizational structure, line and staff authority, centralization and decentralization, span of control, formal and informal organization, forms of organization- function based, product based, geography based, project based, organization design, organizational change, mechanistic and organic structure, virtual and network organization structure.
2.	**Introduction to Human Resource Management:** meaning, objectives and functions of human resource management, difference between HRM and Personnel Management, HRM models, duties and responsibility of HR managers, emerging trend of human resource management in India.
3.	**Human Resource Planning**: definition, importance and processes; job analysis- definition and processes, job enrichment and job enlargement, recruitment and selection: definition, sources of recruitment, selection processes, interview methods.
4.	**Motivation**: Definition and importance, motivation and behavior, theories of motivation: Maslows Need Hierarchy , Two Factor Theory, McClelland's Need Theory, Theory X and Theory Y.
5.	**Training and Development**: definition, importance and nature of training, training and development, types of training, training processes, inputs of training, training for international assignment, emerging trends.

10. Suggested Books

1.	**Human Relations and Organizational Behaviour: a Global Perspective**	**R.S. Dwivedi. Macmillan India Ltd., Delhi**
2.	**Human Resource Management**	**L.M. Prasad**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-026FE** **Course Title** **Technology Management**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective: Technology Management is at the intersection of science, engineering, management and behavioural science. It requires an understanding of how science becomes a technology, how technologies are developed into products, how products meet market demands. It also requires understanding how companies control their internal functions to exploit new technologies and markets. This course addresses the role new technology managers play in technology based businesses.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** Definition and Characteristics of Technology, Role and Importance of Management of Technology, Key concepts of Technology Management.
2.	**Technological Environment:** Levels of Environment, Changes in the Technological Environment, Major Developments in Technological Environment.
3.	**Process of Technological Change:** Overview and Dynamics of Technological Change, Innovation, Components of Innovation, Innovation Dynamics at the Firm Level, Technology Evolution, Characteristics of Innovative Firms, Diffusion, Dynamics of Diffusion, A Model of Innovation Adoption, Factors That Drive the Process of Diffusion.
4.	**Technology and Competition:** Competitive Consequences of Technological Change, Technological Characteristics of Competitive Domains, Dynamics of Change in Competitive Domains.
5.	**Process Innovation, Value Chains and Organizations:** Drivers of Change in Value Chain, Modes of Value Chain Configuration, Value Chain Configuration and Organizational Characteristics.
6.	**Technology Intelligence:** Meaning and Importance of Technology Intelligence. Technology Strategy: Meaning and Key Principles Underlying Technology Strategy, Technology Strategy Types.
7.	**Deployment of Technology in New Products:** Types of New Products, Principles and Process of Product Development; Intellectual Property Protection.

10. Suggested Books

1.	**Managing Technology and Innovation for Competitive Advantage.**	**V. K. Narayanan, Pearson Education.**
2.	**Managing Technology.**	**The Strategic View, Lowell W. Steel e, McGraw Hill.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **IT-603** **Course Title** **Software Engineering**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective: The course is introduced to the students to enable them to give optimal performance and to tackle every challenge during professional experience.

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction:** What is software Engineering? Professional & Ethical responsibility, emergent systems properties, systems engineering, project management.
2.	**Requirements and tools: R**equirements engineering process system model, critical system specification, informal and formal specifications.
3.	**Design methodologies:**architectural design, distributed systems design, application architectures, object oriented design, real time software design, user interface design, rapid software development, software reuse.
4.	**Structural and Functional Testing:**Verification and validation, software testing, critical systems validation.
5.	**Models for reliability and cost:**Software cost estimation, quality management, process improvement, configuration management. Security Engineering, Service oriented software engineering, aspect oriented software engineering

10. Suggested Books

1.	**Software Engineering – A practitioner's approach**	**Roger S Pressman.**
2.	**Fundamentals of Software Engineering**	**Ghezzi, jazayeri,Mandrioli.**
3.	**Software Engineering**	**Sommerville**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **ECE-027FE** **Course Title** **Information Technology in Management**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**3**

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Foundation of Information System:** Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, MIS organization within company, Management information and the systems approach.
2.	**Information Technology:** A managers overview, managerial overviews, computer Hardware & software, DBMS, RDBMS and Telecommunication.
3.	**Conceptual system design:** Define the problems, set systems objective, establish system constraints, determine information needs determine information sources, develop alternative conceptual design and select one document the system concept, prepare the conceptual design report.
4.	**Detailed system design:** Inform and involve the organization, aim of detailed design, project management of MIS detailed design , identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, document the detailed design revisit the manager user.
5.	**Implementation evaluation and maintenance of the MIS:** Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development.
6.	**Advanced Concepts in Information Systems:** Enterprise Resources Management (ERP), Supply Chain Management, C R M, Procurement Management System.

10. Suggested Books

1.	**Management Information System**	**W. S. Jawadekar, 2002, Tata McGraw Hill.**
2.	**Information System for Modern Management**	**Robert G. Murdick, Loel E. Ross & James R. Claggett. PHI**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **MTH-801E** **Course Title** **Optimization Techniques**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective After studying this subject students should be able to formulate and solve linear Programming Problems, determine the optimum solution to constrained and unconstrained, apply dynamic programming principle to Linear programming problems, determine the integer solutions to Linear Programming Problems. **Nil**

7. Pre-requisite

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Linear Programming:** Introduction and formulation of models, Convexity, Simplex method, Big-M method, Two-phase method, Degeneracy, non-existent and unbounded solutions, revised simplex method, duality in LPP, dual simplex method, sensitivity analysis, transportation and assignment problems, traveling salesman problem
2.	**Nonlinear Programming:** Introduction and formulation of models, Classical optimization methods, equality and inequality constraints, Lagrange multipliers and Kuhn-Tucker conditions, quadratic forms, quadratic programming problem, Wolfe's method.
3.	**Dynamic Programming:** Principle of optimality, recursive relations, solution of LPP.
4.	**Integer Linear Programming:** Gomory's cutting plane method, Branch and bound algorithm, Knapsack problem, linear 0-1 problem.

10. Suggested Books

1.	**Introduction to Operations Research**	**Kanti Swarup, Man Mohan and P.K.Gupta**
2.	**Introduction to Operations Research**	**J.C. Pant**
3.	**Mathematical Programming Techniques**	**N.S.Kambo**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **PHY** **Course Title** **Technological Development and Ecology**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Introduction to Environmental Economics**: Interlink between economy and environment, between technological development and environmental degradation, industrialization/ urbanization and environmental degradation, trans-boundary pollution.
2.	**Technological progress and environment and ecology**: Agrochemical pollution: chemical fertilizers, pesticides and preservatives; transgenic technology and threat to environment; polluting chemical industries; fossil fuel based plants and vehicles and the issues of air pollution; greenhouse effect on the production and human health, impact of pollution on biodiversity and economic growth.
3.	**Production technology and exploitation of natural resources**: Classification of natural resources, resource scarcity, market structure and exploitation of non-renewable natural resources, production technology and extraction costs, mechanization and over exploitation of natural resources, economics of forestry exploitation.
4.	**Valuation of environmental resources**: Direct and indirect methods of valuation, cost-benefit analysis, economics of sustainable development, role of technology in development, sustainable technology and industrial ecology.
5.	**Economic Measures to Control Pollution**: Price rationing-charges and subsidies, quantity rationing-marketable permits, pollution taxes.
6.	**Environmental Laws and Regulations**: Environmental management systems: ISO 14000, national environmental policies.

10. Suggested Books

1.	**Environmental Economics-in Theory and Practice**	**Hanley, Nick, Shogren, J F and White Ben. MacMillan India Ltd., New Delhi**
2.	**Technical Change, Relative Prices and Environmental Resource Evaluation**	**Smith, V Kerry. Resources for the Future, 1974**
3.	**Technology and Environment**	**Ausubel, Jesse H. and Sladovich, Hedy E. Academy Press, Washington D C.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **MTH-602** **Course Title** **Discrete Mathematics**

2 Contact Hours

L	3	T	1	P	0

3 Examination Duration (Hrs)

Theory	02	Practical	00

4 Relative Weight age

M-I	20	M-II	20	ASM/CA	10	ME	50

5. Credits

0	3

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Relations:** Product sets, Relations, Representation of relations, Composition of Relations, Partitions, Equivalence Relations.
2.	**Graph Theory:** Graph and Multigraph, Degree of a Vertex, Paths Connectivity, Cut Points, Bridges, Directed Graph and Binary trees.
3.	**Ordered Sets and Lattices:** Ordered Sets, Diagram of Partially ordered Sets, Supremum and Infimum, Well ordered sets, Lattices, Bounded Lattice, Distributive Lattice.
4.	**Propositional Calculus:** Statements, Basic Operations, Truth value of Compound statements, Algebra of Propositions, Tautologies and Contradiction, Conditional, Biconditional, Concept of Boolean Algebra.
5.	**Group Theory:** Group, Semi-Group, Infinite Group, Finite Group, Order of a Group, Abelian Group, Subgroup, Necessary and Sufficient condition for a subset to be a subgroup of a group, Lagrange's Theorem, Cosets, Normal Subgroups, Order of an element of a group, Cyclic group.
6.	**Queuing Models:** Poisson and Exponential Distributions, Role of Poisson and Exponential Distribution in Queuing Theory. Birth and Death models, Single Channel Queuing Model.

10. Suggested Books

1.	**Elements of Discrete Mathematics**	**L.I.V, Tata McGraw Hill.**
2.	**Discrete Mathematic Structures**	**Kohman, Busky and Ross, PHI.**
3	**Discrete Mathematics**	**Schaum's Series, TMH.**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **MTH-806** **Course Title** **Mathematical Analysis**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**

3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**

4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**

5. Credits	**0**	**3**

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Interpolation and Numerical Integration:** Hermite Interpolation and Inverse Interpolation, Numerical differentiation and Numerical Integration, Newton –Cotes integration methods and Gaussian Integration methods.
2.	**Numerical Solution of Algebraic and Transcendental Equations:** Muller Method, Chebyshev Method, Graeffe's root square method, Bairstow Method, Birge-Vieta method.
3.	**Difference Equations:** Formulation of ordinary and Partial differential equations, Numerical solutions of ordinary differential equations, initial value problems, single step method, predictor-corrector methods, Milnes method and Adams Bash Forth method, Numerical methods of solving parabolic partial differential equations. Schmidt method, Crank-Nicolson method and Dufort Frankel method

10. Suggested Books

1.	**Numerical solution of differential equations**	**M.K.Jain, Oscar Publications**
2.	**Mathematical Methods in Chemical Engineering**	**Jansen Jaffreys, Academic Press**
3	**Applied Mathematics in Chemical Engineering**	**H.S.Reed and T.K.S. herwood, McGraw Hill**
4	**Numerical Solution of Ordinary Differential Equations**	**Lapidus, L&J Seinfeld, Academic Press**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: **ELECTRONICS AND COMMUNICATION**

1 Subject Code **PHY-001FE** **Course Title** **Technological Development and Ecology**

2 Contact Hours	**L**	**3**	**T**	**1**	**P**	**0**		
3 Examination Duration (Hrs)	**Theory**	**02**	**Practical**	**00**				
4 Relative Weight age	**M-I**	**20**	**M-II**	**20**	**ASM/CA**	**10**	**ME**	**50**
5. Credits	**0**	**3**						

6. Objective:

7. Pre-requisite **Nil**

8. Total Contact Hours **~ 35-40.**

9. Details of the syllabus:

S.No.	Particulars
1.	**Fundamentals of Environment & Ecology** Environment definition, Environmental Segments, Concepts of Ecosystem: Fundamentals of Ecology and Ecosystem, Components of ecosystem, Food chain, Food web, Trophic level, Energy flow. Introduction, types, characteristic features, structure and function of the following ecosystem: Forest, Grassland, Desert and Aquatic ecosystem. Effects of human activities on environment: Agriculture, Housing, Industry, Mining and Transportation activities, Basics of Environmental Impact Assessment & Sustainable Development.
2.	**Natural Resources** Water Resources - Availability and Quality aspects. Mineral Resources, Soil, Material cycles- Carbon, Nitrogen and Sulphur Cycles. Energy - Different types of energy, Conventional and Non-Conventional sources - Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Geothermal energy and Bio-gas. Gas Hydrates, Hydrogen as an alternative future source of Energy.
3.	**Environmental Pollution & Current Environmental Issues of Importance** **Definition causes effects and control measures of**: Air Pollution, Water pollution, Land pollution, Noise pollution **Climate Change and Global warming:** Effects, Acid Rain, Ozone Layer depletion, Photochemical Smog, Solid waste management, Waste water treatment.
4.	**Environment Quality Standards** Ambient air quality standards, Water quality parameters and standards; Turbidity, pH, Suspended solids, hardness, residual chlorine, sulfates, phosphates, iron and manganese, DO, BOD, COD

10. Suggested Books

1.	**Essentials of Ecology and Environmental Science (PHI)**	**S. V. S. Rana**
2.	**Climate Change: From science to sustainability, 2/e (OUP)**	**Stephen Peake & Joe Smith**
3	**Environmental Studies: From Crisis to Cure 2/e (OUP)**	**R. Rajagopalan**

Lab Code	Lab Name
ECE-070E	Microcontrollers and DSP Core
ECE-071E	Image Processing
ECE-072E	Optical Communications
ECE-073E	VLSI Design
ECE-074E	Wireless Communication Networks
ECE-075E	Visual Programming
ECE-076E	Data Communications
ECE-077E	Virtual Instrumentation
ECE-078E	Network Security

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-070E**	**Course Title**	**Microcontroller and DSP Core**

Credits	**0**	**1**

List of Experiments:

1. Write a program for performing simple arithmetic operations. (8051 Programming)

2. Write a simple program for flashing LEDs using software delays, timers and interrupts.

3. Write a program for interfacing Seven Segment Display and LCD with 8051 and display messages.

4. Write a program for interfacing Keypad with 8051 and display keypad input on LCD.

5. Write a program for square waveform generation, with different frequencies and duty cycles.

6. Write a program for serial communication through UART using polling and interrupt methods.

7. Write a program for interfacing ADC 0804 with 8051.

8. Write a program for Pulse Width Modulation using on-chip PWM and analog I/O modules.

9. Write a program for interfacing Seven Segment Display and LCD to ARM processor.

10. Write a program to interface ARM processor with PC using Tera - Term.

11. Write a program to generate various waveforms

12. Write a program for flashing LEDs using timers and interrupts.

13. Write a program to perform DFT & IDFT of a signal.

14. Write a program to perform convolution of two signals.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-071E**	**Course Title**	**Image Processing Lab**

Credits	**0**	**1**

List of Experiments:

1. Image acquisition, digitization and display.
2. Application of edge detection techniques on Images.
3. Enhancement of images using histogram equalization, histogram modification, and fuzzy Logic.
4. Segmentation of images using thresholding and region growing.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-072E**	**Course Title**	**Optical Communications Lab**

Credits	**0**	**1**

List of Experiments:

1. Voice transmission through optical link.

2. AM system using analog & Digital Input Signals.

3. Frequency Modulation System.

4. Pulse Width Modulation system.

5. Study of Propagation Loss in optical fiber System.

6. Study of Bending Loss.

7. Measurement of Numerical Aperature.

8. Characteristics of E-O Converter (LED)

9. Fiber optic digital link.

10. PC to PC communication Link using optical fiber.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-073E**	**Course Title**	**VLSI Design Lab**

Credits	**0**	**1**

List of Experiments:

1. Write a VHDL code to model a JK Flip Flop (clocked).
2. Write VHDL code with “generate” statement to model a 8-bit Shift Register.
3. Using a “block” statement in VHDL, model a 16-bit Shift Register.
4. Using concurrent statements in VHDL, write a code to model a BCD to 7 Segment Encoder.
5. Design a Decade counter. Write the VHDL code for the same and verify the output.
6. Design a retriggerable monostable output pulse for duration of 10 mS. For sine wave input, write the VHDL code to verify the output.
7. Design a monostable pulse at the start of the pulse train of duration 2 mS. Write a VHDL code for the same.
8. Design a BCD decoder to accept transmitted data serially, decode the data and if any error, detect it and ask for retransmission.
9. Design a PLA circuit.
10. QCA Simulation of reversible logic gates.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-074E**	**Course Title**	**Wireless Communication Lab**
Credits		**0**	**1**

List of Experiments:

1. Study and Analysis of Network Simulator-2

a. Location of different Protocols.

b. Simulate a Network.

c. Modify a C++ code in NS-2

d. Use a trace file

2. Study and Analysis of QualNet.

a. Location of different Protocols.

b. Simulate a Network.

c. Modify a C++ code.

d. Create the results for analysis.

3. Simulate a research Paper related to MANET using NS-2/Qualnet.

4. Simulate a research Paper related to Sensor using NS-2/Qualnet.

5. Simulate a research Paper related to Multicast Network using NS-2/Qualnet.

6. Simulate a research Paper related to Security using NS-2/Qualnet.

7. Simulate a research Paper related to Congestion Control in Wireless using NS-2/Qualnet.

8. Simulate a research Paper related to V-Network using NS-2/Qualnet.

9. Simulate a research Paper related to Routing Protocol of wired Network using NS-2/Qualnet.

10. Simulate a research Paper related to Routing Protocol of Wireless Network using NS-2/Qualnet.

11. Performance Evolution of firewall in Networking (If resource available).

12. Performance Evolution of IP cameras in Networking. (If resource available)

13. Performance Evolution of Phone in Networking (If resource available).

14. Performance Evolution of Network Server (If resource available).

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-075E**	**Course Title**	**Visual Programming Lab**

Credits	**0**	**1**

List of Experiments:

VB

1. Form Design – Keyboard & Mouse events

2. Programs on usage of data types - variant, Control arrays

3. Simple applications using file system controls

4. Database applications using data control.

VC++

1. SDK type programs for creating simple windows with different window styles

2. SDK type programs code for keyboard and mouse events, GDI objects.

3. Simple Dialog Based application – e.g. Calculator, interest computation, money conversions, etc.

4. Creating SDI & MDI applications, Modal and Modeless dialog.

5. Programming for reading and writing into documents.

6. Coding Dynamic controls – slider control, progress control, inheriting CtreeView and Crich-edit-View.

7. Creating static and dynamic splitter windows

8. Creating DLLs and using them.

9. Winsock and WinInet & Internet Explorer common controls.

10. Data access through ODBC – C database, C recordset.

11. Creating ActiveX control and using it.

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NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-076E**	**Course Title**	**Data Communication Lab**

Credits	**0**	**1**

List of Experiments:

1. To study different types of transmission media.

2. To study quadrature phase shift keying and QAM modulation.

3. To study serial interface RS-232.

4. To study pc to pc communication using parallel port.

5. To study LAN using star, bus and tree topology.

6. To configure modem of computer.

7. To configure hub/switch.

8. To study interconnections of cables for data communication.

9. To study pc-pc communication using LAN.

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NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ELE-077E**	**Course Title**	**Virtual Instrumentation Lab**

Credits	**0**	**1**

List of Experiments:

1. Basic arithmetic operations

2. Boolean operations

3. Sum of ‘n’ numbers using ‘for’ loop

4. Factorial of a give number using for loop

5. Sum of ‘n’ natural numbers using while loop

6. Factorial of a give number using while loop

7. Sorting even numbers using while loop in an array

8. Array maximum and minimum

9. Bundle and unbundle cluster

10. Flat and stacked sequence

11. Application using formula node

12. Median filter

13. Discrete cosine transform

14. Convolution of two signals

15. Windowing technique

16. Instrumentation of an amplifier to acquire an ECG signal

17. Acquire, analyze and present an EEG using virtual instrumentation

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

NAME OF THE DEPARTMENT: ELECTRONICS AND COMMUNICATION

Subject Code	**ECE-078E**	**Course Title**	**Network Security Lab**

Credits	**0**	**1**

List of Experiments:

1. Perform an experiment to grab a banner with telnet and perform the task using netcat utility.

2. Perform an experiment for port scanning with nmap, superscan or any other software.

3. Using nmap

   A) Find open ports on a system

   B) Find the machines which are active

   C) Find the version of remote os on other systems

   D) Find the version of s/w installed on other system

4. Perform an experiment on active and passive finger printing using xprobe2 and nmap.

5. Performa an experiment to demonstrate how to sniff for router traffic by using the tool wireshark.

6. Perform an experiment how to use dumpsec.

7. Perform an wireless audit of an access point / router and decrypt WEP and WPA.

8. Perform an experiment to sniff traffic using ARP poisoning.

9. Install ipcop on a linux system and learn all the function available on the software.

10. Install jcrypt tool (or any other equivalent) and demonstrate Asymmetric, symmetric crypto algorithm, hash and digital/pki signatures

11. Demonstrate intrusion detection system (ids) using any tool eg . Snort or any other s/w.