UNIVERSITY OF JAMMU

NOTIFICATION

(19/Aug/Adp/32)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Competent Bodies, has been pleased to authorize the adoption of revised Syllabus of **Bachelor of Engineering (Electronics & Communication Engineering)** for Semester III & IV under the **Choice Based Credit System** as per the model curriculum of the **AICTE (as given in the Annexure)** for the candidates of **all (Govt./Pvt./UIET) Engineering Colleges affiliated with the University of Jammu** for the Examinations to be held in the years indicated against each Semester as under :-

Branch	Semester	For the Examination to be held in the years
E&C	**Semester-III**	**December 2019, 2020, 2021 and 2022**
	Semester-IV	**May 2020, 2021, 2022 and 2023**

The Syllabi of the course is available on the University Website: *www.jammuuniversity.in.*

Sd/-
DEAN ACADEMIC AFFAIRS

No. F.Acd/III/19/4805-4816
Dated:20/08/2019
Copy for information & necessary action to:-

1. Dean Faculty of Engineering
2. Principal, GCET/MIET/MBSCET/UIET/BCET/YCET
3. C.A to the Controller of Examinations
4. Assistant Registrar (Exams/Confidential)
5. Section Officer (Confidential)
6. Incharge University Website

Assistant Registrar (Academics)

19/8 19/8 19/08/19

ANNEXURE- I

B.E. Electronics & Communication Engineering 3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

B.E. Electronics & Communication Engineering 3rd Semester **Contact Hrs: 26**

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATION			MARKS DISTRIBUTION		TOTAL MARKS	CREDITS	%CHANGE
			L	T	P	INTERNAL	EXTERNAL			
PEC-301	Professional Core Courses	Electronic Devices & Circuits- I	3	1	0	50	100	150	4	100%
PEC-302	Professional Core Courses	Digital Electronics	3	1	0	50	100	150	4	100%
EEE-302	Engineering Science Course	Network Theory	3	0	0	50	100	150	3	100%
HMC-302	Humanities & Social Science & Management Courses	Entrepreneur-ship and Business Strategies	3	0	0	50	100	150	3	100%
BSC-301	Basic Science Course	Numerical Methods &Transform Calculus	3	1	0	50	100	150	4	100%
PEC-311	Professional Core Courses	Electronic Devices Lab	0	0	2	75	--	75	1	100%
PEC-312	Professional Core Courses	Digital Electronics Lab	0	0	2	75	--	75	1	100%
PEC-313	Professional Core Courses	Electronics Workshop	0	0	2	50	--	50	1	100%
PEC-303	Professional Core Courses	Mini Project	0	0	2	50	--	50	1	100%
MOC-301		MOOCs								
TOTAL			**15**	**3**	**8**	**500**	**500**	**1000**	**22**	

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDITS: 4**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: PEC-301
COURSE TITLE: ELECTRONIC DEVICES AND CIRCUITS-I
DURATION OF EXAM: 3 HOURS

L	T	P	Marks: Theory	Marks: Sessional
3	1	0	100	50

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Understand the operation of semiconductor devices, rectifiers, concept of noise removal using filters and their applications.
CO2	Apply the concepts of different types of transistors, its biasing conditions to evaluate load lines and operating point parameters.
CO3	Analyze the frequency response and different coupling methods of multistage amplifiers.
CO4	Design different configurations of transistor using hybrid models.

Detailed Syllabus

Section-A

Semiconductor Diodes: Introduction, PN junction biasing conditions, Volt-ampere characteristics, breakdown mechanism(Avalanche, Zener breakdown), Zener diode, Tunnel diode, Schottky diode, LED, photodiode, Varactor diode, PN junction diode as rectifiers, filters, clippers and clampers. (**10 hours)**

Transistors: Working principle, generalized transistor equation, transistor configurations (CE,CC,CB) and characteristics, early effect, Need for biasing, types of biasing circuit, load line concept (AC/DC), Bias stabilization, Introduction to JFET, characteristics, symbol and operation, Biasing of FET with necessary derivations, MOSFET (depletion and enhancement). (**11 hours)**

Section-B

Single and Multistage Amplifiers: Need for cascading, Techniques for improving input resistance (Darlington transistor, Bootstrap emitter follower amplifiers), method of coupling multistage amplifiers (RC coupling, DC coupling, transformer coupling), Frequency response of amplifiers, Effect of emitter and bypass capacitors on the bandwidth and frequency response of a cascaded amplifiers. (**11hours)**

Hybrid Parameters: Introduction. Two port network, hybrid model for CE,CC,CB configuration and their analysis using h-parameters, Miller theorem, Introduction to hybrid pie-model, relationship between h-parameters and hybrid pie-parameters, Current Gain with and without resistive load, single stage CE transistor amplifiers response. (**09 hours)**

RECOMMENDED BOOKS:

1. Integrated Electronics — Millman Halkias
2. Electronics Devices — Bolystead
3. Electronics Devices — Malvino Leach
4. Microelectronics Circuits — Adel S. Sedra

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDITS: 4**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: PEC-302
COURSE TITLE: DIGITAL ELECTRONICS
DURATION OF EXAM: 3 HOURS

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**1**	**0**	**100**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Understand and examine various number systems to be used in digital design.
CO2	Minimize the expressions using Karnaugh map and Quine Mc-Clusky method and implement them using Logic Gates in different logic families.
CO3	Analyze and design various combinational and sequential circuits.
CO4	Formulate problems and simplify with state minimizing techniques.

Detailed Syllabus

Section-A

Number System, Radix conversion, Arithmetic with base other than ten, Binary codes – weighted/Non weighted codes, alphanumeric code, Subtraction of signed/unsigned number. (**8 hours)**

Logic Gates, Boolean algebra, Simplification of Boolean expressions, Minimization techniques, Karnaugh map (up to five variables), Quine Mc-Clusky method, Simplification of Logic families – RTL, DTL, TTL, ECL & MOS families and their characteristics. (**10 hours)**

Section-B

Combinational logic circuits: Half and Full Adders, Subtractors, BCD Adder, Comparators, Multiplexer, Realization of function using MUX, Demultiplexer, Decoder, Encoder, Priority encoders, Code converters, General problems, PLA, Design of combinational circuit using PLA & PAL. (**9 hours)**

Introduction to sequential logic circuits, Synchronous and Asynchronous operation, Flip-Flops– R-S, J-K, D, T & Master-Slave flip-flop, Conversion of flip-flops, Shift registers. **(8 hours)**

Analysis of asynchronous & synchronous sequential counter, Design of sequential logic circuits, Problem formulations, State minimization techniques. (**6 hours)**

RECOMMENDED BOOKS:

01. Digital Electronics — By R.P Jain
02. Digital Electronics & Microcomputer — By R.K. Gaur
03. Computer System Architecture — By M.M. Mano
04. Digital Electronics — By Jamini & K.M. Backward

NOTE: There shallbe total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDITS: 3**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: EEE-302
COURSE TITLE: NETWORK THEORY
DURATION OF EXAM: 3 HOURS

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**0**	**0**	**100**	**50**

COURSE OUTCOMES:	
At the end of the course student will be able to:	
CO1	Apply the knowledge of basic circuital law, dot convention and topological description of Electrical networks.
CO2	Acquire knowledge about the application of differential equation method and Laplace transform in electrical circuits.
CO3	Understand pole-zero configuration and determine parameters of two port network.
CO4	Understand concept and design of filters and synthesize circuits using Foster and Cauer forms.

Detailed Syllabus

Section-A

Conventions for describing networks: Reference directions for currents and voltages, Conventions for Magnetically Coupled Circuits, Circuit Topology. **(5 hours)**

First order differential equation & Laplace Transformations: Differential equations as applied in solving networks, Application of initial conditions, evaluating initial conditions in networks. Laplace Transformation: Initial and final value theorems, convolution integral, convolution as summation, Solution of network problems with Laplace transformation. **(7 hours)**

Network Functions-poles and zeroes: Ports or terminal pairs, Network functions for one port and two port 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. **(7 hours)**

Section-B

Two port parameters: Impedance, Admittance, transmission and hybrid parameters, Relationship between parameter sets, parallel, series & Cascade connection of two port Networks, Characteristics impedance of two port networks. **(7 hours)**

Filters: Filter fundamentals, filter classification, Constant K & m Derived Filters, Design of filters. **(6 hours)**

Network Synthesis: Synthesis problem formulation, properties of positive real functions. Hurwitz polynomials properties of RC, LC and RL driving point, functions. Foster and Cauer synthesis of LC, RL and RC circuits (**6 hours)**

RECOMMENDED BOOKS:

1. Network Analysis — Van Valkenberg
2. Network Analysis & Synthesis — F.F. Kuo
3. Introduction to Circuit Synthesis & Design — Temes & La Patra
4. Fundamentals of Network Analysis & Synthesis — Perikari
5. Network Theory & Filter Design — V. Atre
6. Network analysis and Synthesis — Sudhakar Shyam Mohan

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER
BRANCH: ELECTRONICS & COMMUNICATION ENGG. **CREDITS: 3**
COURSE NO: HMC-302
COURSE TITLE: ENTREPRENEURSHIP AND BUSINESS STRATEGIES
DURATION OF EXAM: 3 HOURS

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**0**	**0**	**100**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Understand in detail entrepreneurial skills and hence may opt entrepreneurship as a career option.
CO2	Understand women/social entrepreneur & legal forms of industrial ownership.
CO3	Apply proper knowledge about lean startups, business pitching, project initiation, execution and implementation.
CO4	Start their own SSI unit with adequate knowledge of schemes and policies for entrepreneurship development.

Detailed Syllabus

Section-A

Entrepreneurship: Definition and Types of entrepreneurs; Qualities of an entrepreneur; factors affecting entrepreneurship; Role of an entrepreneur in economic development; Difference between entrepreneur and manager; Barriers to entrepreneurship. (**6 hours)**

New Generations of Entrepreneurship: Women Entrepreneur: Classification of Women Entrepreneur in India, Problems of Women Entrepreneur, steps for promoting women entrepreneurship; Social Entrepreneur: Problems and steps for promoting social entrepreneurship. (**6 hours)**

Legal Forms of Industrial Ownership: Sole Proprietorship, Partnership, Joint Stock Company (Features, Merits and Demerits); Introduction to business models (**5 hours)**

Section-B

Lean Startups: Introduction to lean startups, Business pitching: Definition, types and importance. (**5 hours)**

Starting a New project/ Venture: Scanning the environment, product development and selection, project report preparation, project resourcing, project planning and scheduling using networking techniques of PERT/CPM(concepts only). (**7 hours)**

Small Scale Industries and policies for entrepreneurship development: Definition of small scale industries; objectives. Role of SSI in economic Development of India. SSI registration, NOC from pollution Board; Machinery and equipment selection; Schemes and Policies for entrepreneurship development. (**6 hours)**

RECOMMENDED BOOKS:

1. Fundamentals of Entrepreneurship, H. Nandan.
2. Alexander Osterwalder& Yves Pigneur, Business model generation
3. Small scale industries and Entrepreneurship, Vasant Desai.
4. Management of small scale Industries; Vasant Desai.
5. Entrepreneurial Development, S S Khanka
6. Entrepreneur Revolution: How to Develop your Entrepreneurial Mindset and Start a Business that works, Daniel Priestley

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDITS: 4**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: BSC-301

COURSE TITLE: NUMERICAL METHODS AND TRANSFORM CALCULUS

DURATION OF EXAM: 3 HOURS

				Marks	
L	**T**	**P**		**Theory**	**Sessional**
3	**1**	**0**		**100**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Learn the basics of Operators, their types and interpolation.
CO2	Find out the exact real root of algebraic and transcendental equations.
CO3	Learn the concept of Laplace Transform, inverse Laplace transform of various function and its applications.
CO4	Understand the idea of Fourier transform, Fourier sine and cosine transform and their property.

Detailed Syllabus

Section-A

NUMERICAL METHODS: Definition of operators, Finite and divided difference, Interpolation using Newton's and Lagrange's formulas. Numerical differentiation, numerical integration: Trapezoidal rule and Simpson's 1/3rd rule. Numerical solutions of algebraic and Transcendental equations by Regula Falsi, Newton-Raphson and direct iterative methods, solution of differential equations by Taylor's method, Picard's method, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. **(20 hours)**

Section-B

LAPLACE TRANSFORM: Laplace Transform, Properties of Laplace Transform: Linear property, change of scale property, first shifting property, second shifting property, Multiplication by t property, division by t property, convolution property, Laplace transform of periodic functions, Laplace transform of derivatives. Finding inverse Laplace transform by different methods. Evaluation of integrals by Laplace transform, solving differential equations of higher order by Laplace Transform. **(12 hours)**

FOURIER TRANSFORM: Fourier Integrals, Fourier transforms, Fourier integral theorem, Fourier sine and cosine integrals, and their inverses. Properties of Fourier transforms. Application of Fourier transform to solve integral equations. Fourier sine and cosine integrals, and their inverses. **(08 hours)**

RECOMMENDED BOOKS:

1. N.P. Bali and M. Goyal, "A text book of Engineering Mathematics", Laxmi Publications, 2008.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 2010.
3. Dr.Bhopinder Singh,'' ENGINEERING MATHEMATICS III"
4. Dr.Bhopinder Singh,'' Complex analysis and Numerical Methods".

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDITS: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-311

COURSE TITLE: ELECTRONIC DEVICES& CIRCUITS- I LAB

L	T	P	Marks Practical
0	0	2	75

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Plot forward and reverse characteristics of silicon and Zener diodes.
CO2	Fabricate half and full wave rectifiers and evaluate their performance parameters.
CO3	Plot the characteristics of FET using trainer kits.
CO4	Plot V-I characteristics of transistor for various configurations using trainer Kit.

LIST OF PRACTICALS

1. To perform the operation characteristics of PN junction diode(Forward/Reverse Characteristics).
2. To perform the operation characteristics of Zener diode (Forward/Reverse Characteristics).
3. To perform the characteristics of Half wave Rectifier.
4. To perform the characteristics of Full wave Rectifier and Bridge Rectifier.
5. To perform the operation characteristics (Input/output) of PNP/NPN Transistor (Common Emitter/Common Base).
6. To perform the frequency response of signal amplifier (CE/CB).
7. To perform the characteristics of FET.
8. Determination of h parameter from transistor characteristics.
9. Design of Self Bias circuit using BJT.
10. Design of Self Bias circuit using FET.

NOTE: Each student has to perform atleast eight experiments out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDIT: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-312

COURSE TITLE: DIGITAL ELECTRONIC LAB

			Marks
L	T	P	Practical
0	0	2	75

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Implement and verify Boolean expressions using Logic Gates.
CO2	Design and implement various combinational circuits using digital IC's.
CO3	Design seven segment decoder using Logical Gates.
CO4	Design and implement various sequential circuits using digital IC's

LIST OF PRACTICALS

1. Verification of truth tables of Logical Gates AND / OR / NOT, NAND, NOR, EXOR, EXNOR, Gates.
2. Implementation of Boolean expression using AND, OR, NOT, NAND, & NOR logic.
3. Implementation of Decoder, Encoder using IC's & Gates.
4. To implement Half Adder, Half Subtractor, Full Adder, Full Subtractor using different IC's & Gates.
5. Implementation of multiplexer, demultiplexer using IC's & gates.
6. Design of BCD to seven segment display using logical gates & IC's.
7. To design & verify truth table of Flip Flops.
8. To design various asynchronous counters using flip flops, gates & IC's.
9. To design various synchronous counters using flip flops, gates & IC's.
10. To design & verify truth tables of shift Registers.

NOTE: Each student has to perform atleast eight experiments. Additional Practical / Experiments will be performed based on the course content requirements.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER				**CREDITS: 1**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.				**Marks**
COURSE CODE: PEC-313	**L**	**T**	**P**	**Practical**
COURSE TITLE : ELECTRONICS WORKSHOP	**0**	**0**	**2**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Analyze different electronic components.
CO2	Fabricate various electronic circuits on breadboard.
CO3	Assemble various type of ICs on breadboard.
CO4	Design electronic circuits using soldering techniques.

LIST OF PRACTICALS

1. Familiarization with various electronic components like resistor, capacitor, transistors, diodes, ICs, transformers etc.
2. To assemble the half wave rectifier and full wave rectifier circuit on breadboard.
3. To assemble the Common emitter Amplifier circuit
4. To assemble the differentiator circuit using IC741 on breadboard.
5. To assemble the astable multivibrator using 555 timer IC on breadboard.
6. To get familiar with soldering techniques.

NOTE: Each student has to perform all the aforementioned Practical / Experiments Additional Practical / Experiments will be performed based on the course content requirements.

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDIT: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE TITLE: MOOCs

COURSE NO: MOC-301

L	T	P	Marks Practical
0	0	2	50

MOOCS: A massive open online course (MOOC) is a model for delivering learning content to any person who wants to take a course by means of the web. It has been incorporated in the 3rd semester.

Breakup of Marks:

- **Attendance- 10 marks**
  Students will have to visit the lab twice a week as per the time table and pursue their respective online course.

- **Report file-15 marks**
  A detailed report of about 20-25 pages has to be submitted to the department at the end of the semester. It should contain details about the course that was undertaken by the student. A copy of the assignments with solutions that have been uploaded on the MOOC platform should also be included in the final report. A copy of the certificate if awarded should also be appended to the report.
- **Presentation- 15 marks.**
  The presentation should be given to the peers/students focusing on the key points of the course with an aim to share the knowledge.

Certification- 10 marks

The students awarded with the certificate will be given 10 marks.(Copy to be attached in the report.)

3rd Semester Examination to be held in the Year December 2019, 2020, 2021, 2022

CLASS: B.E. 3RD SEMESTER **CREDIT: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE TITLE: MINI PROJECT

COURSE NO: PEC-303

L	T	P	Marks Practical
0	0	2	50

The mini-project is a team activity having 3-4 students in a team. This is electronic product design work with a focus on electronic circuit design. Mini Project should cater to a small system required in laboratory or real life. It should encompass components, devices, analog or digital ICs, with which functional familiarity is introduced. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of mini-project. Completed mini project and documentation in the form of mini project report is to be submitted at the end of semester.

Distribution of Marks:

Attendance	**10 marks (20%)**
Report files	**15 marks (30%)**
Actual work done	**15 marks (30%)**
Viva-voce	**10 marks (20%)**

ANNEXURE-II

B.E. Electronics & Communication Engineering 4th Semester Examination to be held in the Year May 2020, 2021, 2022, 2023

B.E. Electronics & Communication Engineering 4th Semester **Contact Hrs: 28**

COURSE CODE	COURSE TYPE	COURSE TITLE	LOAD ALLOCATIONS			MARKS DISTRIBUTION		TOTAL MARKS	CREDITS	%CHANGE
			L	T	P	INTERNAL	EXTERNAL			
PEC-401	Professional Core Courses	Analog Communication	3	1	0	50	100	150	4	100%
PEC-402	Professional Core Courses	Electronic Devices& Circuits II	3	1	0	50	100	150	4	100%
PEC-403	Professional Core Courses	Electromagnetic Waves& Transmission Lines	2	1	0	50	100	150	3	100%
PEC-404	Professional Core Courses	Signals and Systems	3	1	0	50	100	150	4	100%
EEE-401	Engineering Science Course	Electric Machines	2	1	0	50	100	150	3	100%
PEC-411	Professional Core Courses	Analog Communication Lab	0	0	2	75	--	75	1	100%
PEC-412	Professional Core Courses	Electronic Devices -II Lab	0	0	2	75	--	75	1	100%
EEE-411	Engineering Science Course	Electric Machines Lab	0	0	2	50	--	50	1	100%
PEC-413	Professional Core Courses	MATLAB	0	0	2	50	--	50	1	100%
NCC-401	Non Credit Course	Cyber Ethics & Laws	2	0	0	Satisfactory / Un-satisfactory			Non-credit	100%
TOTAL			**15**	**5**	**8**	**500**	**500**	**1000**	**22**	

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 4**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-401

COURSE TITLE: ANALOG COMMUNICATION

DURATION OF EXAM: 3 HOURS

				Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**1**	**0**	**100**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Distinguish between different types of modulation techniques based on bandwidth occupied and power transmitted.
CO2	Compare the performance of communication system by evaluating the figure of merit for different schemes of modulation.
CO3	Understand the performance of communication systems in the presence of noise and interference.
CO4	Familiar with Superhetrodyne receivers.
CO5	Apply techniques like matched filter, pulse shaping, line encoding and equalizer to mitigate the adverse effects of noise and dispersion.

Detailed Syllabus

Section-A

Continuous Wave Modulation: The essentials of a Communication system, Amplitude modulation and demodulation , Generation of DSBSC waves, Coherent detection of DSBSC waves, Single side band modulation and demodulation, vestigial sideband modulation (VSB), frequency division multiplexing, Frequency modulation and demodulation, Introduction to super heterodyne receivers. (**12 hours)**

Effect of noise on Analog communication: Internal and external noise, Signal to noise ratio, Noise figure, Noise in AM and FM systems. (**8 hours)**

Section-B

Pulse Modulation: Sampling Process, Pulse-Amplitude Modulation, and Other forms of Pulse Modulation, Quantization Process, Pulse-Code Modulation, Time-Division Multiplexing, Delta Modulation, Linear Prediction, Differential Pulse-Code Modulation, and Adaptive Differential Pulse-Code Modulation. **(10 hours)**

Baseband Pulse Transmission: Introduction, Matched Filter, Error Rate Due to Noise, Intersymbol Interference, Nyquist's Criterion for distortionless Baseband Binary Transmission. (**8 hours)**

BOOKS RECOMMENDED:

01. Electronics Comm. System By G. Kennedy
02. Principles of Comm. System By Taub& Schilling
03. Communication System By SimonHaykins

NOTE: There shallbe total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 4**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-402

COURSE TITLE: ELECTRONIC DEVICES & CIRCUITS II

DURATION OF EXAM: 3 HOURS

				Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**1**	**0**	**100**	**50**

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Analyse classification and topologies of amplifier based on different parameters.
CO2	Understand the concept, need and design of oscillators.
CO3	Formulate different types of distortions for large signal amplifiers circuits.
CO4	Apply the concepts of voltage regulators for practical applications.

Detailed Syllabus

Section - A

Feedback Amplifier: Need for feedback, Feedback concept, Advantages of negative feedback, Ways of introducing negative feedback in amplifiers, Gain with and without feedback, Effect of negative feedback on input, output resistance and bandwidth of the amplifier, their respective analysis for feedback amplifiers, Procedure for analysis of feedback amplifiers, Analysis of different topologies. **(10 hours)**

Sinusoidal Oscillators: Introduction, necessity of oscillator, Gain with feedback, Barkhausen criteria, Requirements of oscillators, RC oscillators and phase shift oscillators, Wien bridge oscillators, LC oscillators, Crystal oscillators. (**10 hours)**

Section-B

Power Amplifiers: Introduction, general features of power transistor, difference between power transistor & a voltage amplifier, Classification of power amplifiers with necessary derivations, cross over distortion & its remedy, determination of harmonic distortion. (**10 hours)**

Voltage Regulators: Introduction and necessity of Voltage regulators, difference between unregulated & regulated power supply, types of Voltage regulators (Shunt and Series), monolithic and IC regulators (78XX, 79XX, LM317, LM337), switching regulators. (**10hours)**

BOOK RECOMMENDED:

1. Integrated Electronics MillmanHalkais
2. Electronics Devices Bolystead
3. Electronics Devices Malvino Leach
4. Microelectronics Sedra& Smith

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 3**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-403

COURSE TITLE: ELECTROMAGNETIC WAVES & TRANSMISSION LINES

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
2	**1**	**0**	**100**	**50**

DURATION OF EXAM: 3 HOURS

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Attain knowledge about the vector analysis, coordinate system, electric and magnetic fields and calculation of flux density, potential and energy densities.
CO2	Analyse the Maxwell's equations and the wave propagation equation in free space and in different media.
CO3	Study the Transmission line and its parameters.
CO4	Solve for transmission line parameters at high frequencies and principles of impedance matching and Smith Chart.

Detailed Syllabus

Section - A

ELECTROSTATICS: Revision of vector analysis with rectangular, cylindrical, Spherical & polar coordinates, Electrostatic Potential, Potential gradient, Method of images, Energy density in electrostatics field, Electric field in dielectric media, Capacitance, Solution of Electrostatic problems using Poisson's & Laplace equation. **(6 hours)**

MAGNETOSTATICS: Magnetic flux density, & Magnetic potential, Torque on a closed circuit, Energy density in the magnetic field. **(3 hours)**

MAXWELL EQUATION UNIFORM PLANE WAVE : Application of Maxwell equation to circuits, Wave motion in perfect dielectric, Plane wave in Lossy dielectric, Propagation in good conduction, Standing wave ratio, Polarization, Reflection of uniform plane wave. **(6hours)**

Section – B

TRANSMISSION LINE: Basic principles of T.L, Equivalent circuit of T.L, Basic transmission line equation, Input impedance, infinite T.L, Characteristics impendence (Zo), Propagation constant, attenuation constant, Phase constant, open and short circuits T.L, Velocity, wavelength, Voltage and power on line. Distortion in line Reflection and its coefficient. (8 **hours)**

LINE AT HIGH FREQUENCIES: Line Equation, Waveform on line terminated in various impedances, SWR, & its relation with reflection coefficient. Impedance of short Circuit and open Circuit line. Characteristic of λ/2 &λ/4 lines. Principle of Impedance matching & use of smith chart for impedance matching using λ/4 transformer & single stub. **(7 hours)**

BOOK RECOMMENDED:

01. Engineering Electromagnetic By Jseph A. Edminister
02. Introduction to Electromagnetic By Griffith
03. Engineering Electromagnetic By Jr. Hyat
04. Network Line & Filters By J. D. Ryder
05. Antenna & Wave Propagation By K. D. Prasad

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 4**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: PEC-404
COURSE TITLE: SIGNALS AND SYSTEMS
DURATION OF EXAM: 3 HOURS

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
3	**1**	**0**	**100**	**50**

COURSE OUTCOME	
At the end of the course student will be able to:	
CO1	Understand Mathematical description and representation of continuous and discrete time signals and systems.
CO2	Understand system properties and able to describe systems using linear constant coefficient differential equations and using their impulse response.
CO3	Compute the output of an LTI system given the input and the impulse response through convolution sum and convolution integral.
CO4	Develop basic problem-solving skills and become familiar with formulating a mathematical problem from a general problem statement.

Detailed Syllabus

Section-A

Representation / Classification of Signals and Systems: Continuous time signals –Discrete time signals – Representation of signals – Step, Ramp, Pulse, Impulse, Sinusoidal,Exponential signals, Operation on the signals – Classification of continuous time anddiscrete time signals – Periodic, Aperiodic, Deterministic, Random, Even, Odd, Energy and Power Signals – Continuous time and discrete time systems – Classification of systems –Properties of systems. (**10 hours)**

Continuous Time Signal Representation / Analysis: Fourier series analysis –Representation of periodic signals in trigonometric and exponential forms – Fourier transform analysis of aperiodic signals
– Spectral analysis of periodic and aperiodic signals– Parseval's theorem for periodic and aperiodic signals – Laplace transform in signal analysis. **(10 hours)**

Section-B

Discrete Time Signal Representation / Analysis: Discrete time Fourier series – Discrete time Fourier transform – Spectrum of discrete time periodic and aperiodic signals –Parseval relations – Z transform – Properties and application to discrete time signal analysis – Inverse Z transform. **(10hours)**

Discrete Time Systems: LTI discrete time systems – Difference equation – Block diagram representation and reduction techniques – impulse response – Convolution Sum –Properties of discrete time LTI systems – Frequency response – Analysis of LTI system using Fourier and Z transform techniques. **(10 hours)**

BOOK RECOMMENDED :

01. Fundamentals of Signals & Systems — By Michael J Roberts
02. Principles of Signal Processing & Linear System — By B.P. Lathi
03. Signals & Systems — By Alan V. Oppenheim, Alan S. Willsky
04. Signals & Systems — ByA. Anand Kumar
05. Signals & Systems — By Simon Haykin, Barry Van Veen

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 3**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: EEE-401
COURSE TITLE: ELECTRIC MACHINES
DURATION OF EXAM: 3 HOURS

			Marks	
L	**T**	**P**	**Theory**	**Sessional**
2	**1**	**0**	**100**	**50**

COURSE OUTCOME	
At the end of the course student will be able to:	
CO1	To acquire knowledge about the construction and operating characteristics of DC machines.
CO2	To identify the relation between transformer and autotransformers.
CO3	To understand the principle of operation, testing and speed control of synchronous machines as generators and motors.
CO4	To analyze the application of special machines in various fields with their working principle.

Detailed Syllabus

Section - A

D.C. Generators: Operating principle, constructional features, E.M.F equation, Armature reaction and commutation, operating characteristics losses and efficiency. **(6 hours)**

D.C.Motors: Operating principle, back EMF, Torque equation, Starters, speed control, operating characteristics, and their applications. **(6 hours)**

Transformers: Principle of operation, Vector diagram, Regulation efficiency parallel operation, tap changing auto transformer. **(6 hours)**

Section - B

Synchronous Generators: Principle of operation, E.M.F equation, Leakage reactance, Vector diagram, Voltage regulation by EMF and MMF method. **(6 hours)**

Synchronous Motors: Principle of operation, Vector diagram, V-curves and inverted V-curves, method of starting and their applications. (**6 hours)**

Induction Motors: Principle of operation, Types of motors, Equivalent circuits, Torque and power calculations, No load and blocked rotor test, speed control, Method of starting and their applications. (**8hours)**

Special A.C. Machines: Repulsion motors, A.C series motors, Universal motor, single phase induction motor and their applications. **(4 hours)**

BOOKS RECOMMENDED:

1) Theory of A.C Machines — A. Langsdrof
2) Principles of D.C. Machines — Clayson and Hancock
3) Performance and design of A.C Machines — M.G. Say
4) Advanced Electrical Technology — H.A. Cotton

NOTE: There shall be total eight questions, four from each section. Each question carries 20 marks. Five questions have to be attempted, selecting at least two from each section. Use of calculator is allowed.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-411

COURSE TITLE: ANALOG COMM. LAB

L	T	P	Marks Practical
0	0	2	75

COURSE OUTCOME At the end of the course student will be able to:	
CO1	Plot frequency response of RF Tuned Amplifier and IFT by calculating gain at different range of frequencies.
CO2	Understand the significance of modulation index in communication system by observing maximum and minimum value in AM modulated wave.
CO3	Design frequency modulation circuit using IC 8038.
CO4	Design sampler using IC-LF398, ASK modulation circuit using transistor BC547.

LIST OF EXPERIMENTS

01. To plot the response of RF Tuned Amp.
02. To find the modulation index of AM signal.
03. Hardware realization of AM demodulation circuit.
04. Hardware realization of FM modulation circuit using IC 8038.
05. To plot the response of IF transformer.
06. Hardware realization of sample & hold circuit.
07. Hardware realization of ASK modulation circuit.
08. Study of PCM & TDM signal.

NOTE: Each student has to perform atleast six experiments out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-412

COURSE TITLE: ELECTRONIC DEVICES -II LAB

L	T	P	Marks Practical
0	0	2	75

COURSE OUTCOME	
At the end of the course student will be able to:	
CO1	Calculate the voltage gain, resistance calculation at input and output using feedback and without feedback.
CO2	Distortion output calculation at the output of Class B amplifier.
CO3	Plot the frequency response of class C amplifier
CO4	Calculation of output power and efficiency of a class A amplifier.
CO5	Study the output of push pull amplifier.
CO6	Study stability factor for Zener, shunt and IC regulators.
CO7	Designing of voltage regulator using series pass transistor.
CO8	Determine the output of Collpitt, Clap,Hartley, Wein bridge in frequency form.

LIST OF PRACTICALS

01. Determination of voltage gain, Input/output resistance of amplifiers using with & without feedback.
02. Determination of Distortion output power in case of push pull class-B amplifier.
03. Determination of frequency response of class-C tuned amplifier.
04. Study of signal stage class-A power amplifier & determine output power & efficiency.
05. Study of complimentary symmetry push pull amplifier.
06. Design & determination of stability factor series of Zener shunt Regulator / IC Regulator.
07. Design of voltage regulator using series pass transistor.
08. Study of Collpitt, Clapp, Hartley, Wein bridge, Phase regulator & determine the frequency of output waveform.

NOTE: Each student has to perform atleast six experiments out of which 40% shall be simulation based. Additional Practical / Experiments will be performed based on the course content requirements.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: EEE-411

COURSE TITLE: ELECTRICAL M/C LAB

L	T	P	Marks Practical
0	0	2	50

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Identify the parts of cut-sectional model of D.C.and AC machines.
CO2	Study the operating characteristics of D.C. machine and AC machines.
CO3	Determine the voltage regulation and efficiency of transformer
CO4	Perform the turns ratio and polarity test on single-phase transformer.

LIST OF EXPERIMENTS

1. To study the magnetic characteristics of a D.C. Machines at various operating speeds and finds the operating point of D.C. shunt machine from the same.
2. To determine the load characteristics of a D.C. Shunt generator and find its overall efficiency.
3. To study the torque/speed characteristics of a D.C. series, shunt and compound motor motor using various field tapings.
4. To find the efficiency and study various losses of D.C. Machines using Hopkinson test.
5. To study a single phase transformer, its Voltage ratio and turns ratio relationship. Perform open & short circuit test to determine losses, efficiency and voltage regulation and also its various parameters.
6. Study of parallel operation & synchronization of 3-phase synchronous generators.
7. Speed control of 3-phase Induction motor by varying supply frequency & of 3-phase slip Ring Induction motor by Rotor Impedance Control.
8. To determine turn ratio and to perform polarity test on single phase transformer.

NOTE: Each student has to perform atleast six experiments. Additional Practical / Experiments will be performed based on the course content requirements.

4th Semester Examination to be held in the Year May 2020,2021,2022,2023

CLASS: B.E. 4TH SEMESTER **CREDITS: 1**

BRANCH: ELECTRONICS & COMMUNICATION ENGG.

COURSE NO: PEC-413

COURSE TITLE: MATLAB PROGRAMMING

L	T	P	Marks Practical
0	0	2	50

COURSE OUTCOMES	
At the end of the course student will be able to:	
CO1	Perform various arithmetic calculations.
CO2	Find importance of this software for generating equations of vectors and other mathematical expressions.
CO3	Articulate importance of software's in creating and printing simple,2D &3D plots and execution functions
CO4	Do various library blocks and their interconnections.

LIST OF EXPERIMENTS:

1. Study of arithmetic, exponential, Logarithmic, Trigonometric, complex number calculation.
2. To generate equation of straight line, Geometric series, points on circle, multiply, divide and exponential vectors.
3. To create and print simple plots and execution of functions.
4. To generate matrices and vectors, array operations, inline functions anonymous functions etc.
5. To generate functions like execution a function, global variable, structures.
6. To generate 2D, 3D plots.
7. Study of various library blocks and their interconnections.

NOTE: Each student has to perform all the aforementioned Practical / Experiments. Additional Practical / Experiments will be performed based on the course content requirements.

4th **Semester Examination to be held in the Year May 2020,2021,2022,2023**

CLASS: B.E. 4TH SEMESTER **CREDITS: 0**
BRANCH: ELECTRONICS & COMMUNICATION ENGG.
COURSE NO: NCC-401
COURSE TITLE: CYBER ETHICS & LAWS

L	T	P	
2	**0**	**0**	**Theory**
			Satisfactory/Unsatisfactory

COURSE OUTCOMES	
At the end of the course the student will be able to: -	
CO1	Understand the basic concepts of Cyber Ethics &Laws.
CO2	Understand about the constitutional and Human Rights Issues in Cyber space.
CO3	Understand Cyber Crimes and Legal Framework.
CO4	Understand about the limitations and current issues in the area.

Detailed Syllabus

Unit-I: Ethics in Cyber Space, Core Values and Virtues, Dimensions of Cyber Ethics in Cyber Society, Cyber Ethics by Norms, Laws and Relations, Principle & Significance of Cyber Ethics, Ethics in Information Society.

Unit-II: Computer and its impact in Society, Overview of Computer and Web Technology, what are Cyber Laws, Need for Cyber Laws, Cyber Jurisprudence at International and Indian Level

Unit-III: Objectives, Importance of Cyber Laws, Right to Access Cyberspace-Access to internet, Right to privacy, Right to data protection, Advantages and Disadvantages

Unit-IV: Cyber Crime against Individual, Institution and State, Types of Cyber Crimes, Cyber Crimes and Legal Framework

Unit-V: Limitations and Current Issues relating Cyber Ethics & Cyber Laws in the Society

BOOKS RECOMMENDED:

1. Cyber Laws — Justice Yatindra Singh
2. Cyber Laws and Crimes Simplified — Adv. Prasant Mali
3. Cyber Ethics 4.0 — Christoph Stuckelberger and Pavan Duggal

NOTE: This is a Mandatory Non-Credit Course. Two objective papers will be conducted internally by the department. The students are required to score at least 40% or above in totality to be considered qualified in the course.