SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech)

Electronics and Telecommunication Engineering

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

Semester III

Sr. No	Code No.	Subject	Semester	Credits
1	BSC-ETC301	Engineering Mathematics-III	3	4
2	PCC-ETC-301	Electronic Circuit Design-I	3	5
3	PCC-ETC302	Network Analysis	3	5
4	PCC-ETC303	Transducers and Measurement	3	4
5	PCC-ETC304	Analog Communication	3	4
6	PCC-ETC305	Programming Lab-I	3	3
7	MC-ETC-301	Environmental studies	3	3**
Total				**25**

**over and above credit

Semester IV

Sr. No.	Code No.	Subject	Semester	Credits
1	PCC-ETC401	Electronic Circuit Design-II	4	5
2	PCC-ETC402	Linear integrated Circuits	4	5
3	PCC-ETC403	Control System Engineering	4	4
4	PCC-ETC404	Digital Communication	4	4
5	PCC-ETC405	Data Structures	4	4
6	PCC-ETC406	Programming Lab-II	4	3
Total				25

***For Theory CIE 30 Marks,**

Two tests of 30 marks at college should be conducted and best of two marks should be communicated to university.

***Guidelines to paper setter:**

In theory ESE examination of 70 marks following pointes should be considered,

1. First question of 10 marks should be allotted to Objective type questions.
2. In Remaining 60 marks, four questions of 15 marks should be considered.

SECOND YEAR ELECTRONICS & TELECOMMUNICATION ENGINEERING – CBCS PATTERN

Semester Examination

SEMESTER - III																								
Sr. No	Course (Subject Title)	TEACHING SCHEME									EXAMINATION SCHEME													
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERM WORK				
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	Min	Hours	Max	Min	Hours	Max	Min			
1	BSC-ETC301	3	3	3	1	1	1	-	-	-		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10			
												ESE	70											
2	PCC-ETC301	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
3	PCC-ETC302	4	4	4	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
4	PCC-ETC303	3	3	3	-	-	-	1	2	2		CIE	30	100	40				2	25	10			
												ESE	70											
5	PCC-ETC304	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
6	PCC-ETC305	2	2	2	-	-	-	1	2	2		-	-	-	-		50	20	2	25	10			
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**500**			**150**			**150**				
SEMESTER –IV																								
1	PCC-ETC401	4	4	4	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	50	20	2	25	10			
												ESE	70											
2	PCC-ETC402	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10			
												ESE	70											
3	PCC-ETC403	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
4	PCC-ETC404	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
5	PCC-ETC405	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10			
												ESE	70											
6	PCC-ETC406	2	2	2	-	-	-	1	2	2							50	20	2	25	10			
7	MC-ETC	-	-	-	-	-	-	-	-	-		CIE	30	100	10		-	-		-	-			
												ESE	70		30									
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**600**			**150**			**150**				
	TOTAL	**38**	**38**	**38**	**4**	**4**	**4**	**8**	**16**	**16**				**1100**			**300**			**300**				

CIE- Continuous Internal Evaluation. ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for S.E. Sem III & IV : **1600**
• Theory and Practical Lectures : 60 Minutes	• Total Credits for S.E. Sem III & IV : **50**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **BSC-ETC**: Basic Science Course- Electronics & Telecommunication Engineering are compulsory.
2. **PCC-ETC:** Professional Core course –Electronics & Telecommunication Engineering are compulsory.
3. **MC-ETC:** Mandatory Course**:** Environmental Studies which is compulsory for theory 70 marks and project work 30 marks.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

ENGINEERING MATHEMATICS-III

Course Details

Class	**S. Y. B. Tech Sem - III**
Course Code and Course Title	**BSC-ETC-301- Engineering Mathematics -III**
Prerequisites	**Basic Trigonometry, Derivative and Integration, Basic Probability.**
Teaching scheme :Lecture /Practical/Tutorial	**3/0/1**
Credits	**3+1**
Evaluation scheme CIE/ESE for Theory	**30/70**

Teaching scheme	Examination scheme
Lectures :03Hrs/week	**Theory : 100 Marks, 70(ESE)+30(CIE)**
Tutorial : 01Hr/week	**TW: 25 Marks**

Course Objectives: The course aims to :

01	To develop mathematical skills and enhance thinking power of students
02	To give the knowledge to the students of fuzzy set theory, Linear Differential Equations probability,Laplace transforms,Fourier series with an emphasis on the application of solving engineering problems
03	To prepare students to formulate a mathematical model using engineering skills & interpret the solution in real world.

Course Outcomes:
Upon successful completion of this course ,the students will be able to:

01	Make use ofLinear Differential Equations to solve the Electrical Engineering problems.
02	Applyknowledge of vector differentiation to find directional derivatives, curl and divergence of vector fields.
03	Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support, etc.
04	Develop Fourier series expansion of a function over the given interval.
05	Find Laplace transforms of given functions and use it to solve linear differential equations.
06	Solve basic problems in probability theory, including problems involving the binomial, Poisson, and normal distributions

Course Content

Section I

Unit No 1 **Linear Differential Equations (LDE) and its Applications**: **07hrs**

1.1 Linear Differential equations with constant coefficients.

1.2 Rules to find complementary function.

1.3 Methods to find particular Integral

(e^{ax}, sinax or cosax, $x^m, e^{ax}x^m, e^{ax}sinax$ or $e^{ax}cosax$)

1.4 Cauchy's homogeneous linear differential equations.

1.5 Applications of linear differential equations with constant coefficients to Electrical engineering.

Unit No 2 **Vector Differential Calculus**: **07 hrs**

2.1 Differentiation of vectors.

2.2 Gradient of scalar point function.

2.3 Directional derivative.

2.4 Divergence of vector point function.

2.5 Curl of a vector point function.

2.6 Irrotational, Solenoidal and Scalar potential function of a vector field.

Unit No 3 **Introduction to Fuzzy sets:** **07hrs**

3.1 Crisp set and Fuzzy set.

3.2. Basic concepts of fuzzy sets

3.3 Basic operations on fuzzy sets.

3.4 Properties of fuzzy sets.

Section II

Unit No 4. **Fourier Series:** **07hrs**

4.1 Introduction.

4.2 Definition, Euler's formulae.

4.3 Dirichlet's conditions.

4.4 Change of interval.

4.5 Expansions of odd and even functions.

4.6 Half range series.

Unit No 5 **Laplace Transform and its Applications:** **07hrs**

5.1 Laplace transform of elementary functions.

5.2 Properties of Laplace transforms(First Shifting , Change of scale property , Multiplication & Division by t).

5.3 Laplace transforms of derivatives and integral.

5.4 Inverse Laplace transforms by partial fractions & convolution theorem.

5.5 Solution of Linear differential equation with constant coefficients using Laplace transform.

Unit No 6 Probability Distribution: 07hrs

6.1 Random variables.

6.2 Discrete Probability distribution.

6.3 Continuous probability distribution.

6.4 Binomial Distribution.

6.5 Poisson Distribution.

6.6 Normal Distribution.

Text Books:

01 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

02 Applied Mathematics Wartikar P N and Wartikar J N , (Pune Vidyarthi Grah Prakashsn)

Reference Books:

01 Advance Engineering Mathematics by Erwin Kreyszig (Wiley India.)

02 Mathematical Methods of Science and Engineering, by Kanti B. Datta (Cengage Learning.)

03 Advanced Engineering Mathematics, 3e, by Jack Goldberg (Oxford University Press.)

04 Engineering Mathematics by V. Sundaram (Vikas Publication.)

05 Higher Engineering Mathematics, by B. S. Grewal (Khanna Publication Delhi.)

06 Higher Engineering Mathematics, by B. V. Ramana (Tata McGraw-Hill)

07 Advanced Engineering Mathematics, by H. K. Das (S. Chand Publication.)

08 Fuzzy Sets and Fuzzy Logic: Theory and Applications, by George J. Klir and Bo Yuan (Prentice Hall of India Private Limited.)

09 Applied Mathematics by Navneet D. Sangle (Cengage Publication)

General Instructions:

1)For the term work of 25 marks, batch wise tutorials are to be conducted. The number of students per batch per tutorial should be as per University rules.

2)Number of assignments should be at least six (All units should be covered).

Prepared By BOS Maths :

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

1. Electronic Circuit Design - I

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-301-**Electronic Circuit Design - I**
Prerequisites	**Basic Circuit Law's, Semiconductor diode, Zener diode, BJT details.**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:
The course aims to:

1. Provide an introduction and basic understanding of Semiconductor Devices viz. diodesand BJT, JFET.
2. Provide basic analog electronic circuit design techniques using diodes and bipolarjunction transistors and to develop analytical skills.
3. Develop student ability to apply basic engineering sciences to understand the operation& analysis of electronic circuits using diodes and bipolar junction transistors.
4. Design electronic circuits to meet the desired specifications.

Course Outcomes:
Upon successful completion of this course, the student will be able to:

1. Analyze and design electronic circuits such as rectifiers & unregulated power supply.
2. Analyze and design electronic circuits such as regulated power supply.
3. Analyze & Design of BJT & FET Biasing.
4. Explain the hybrid model of transistor and analyze the transistor amplifier (CE, CB,CC) using h-parameters
5. Analysis of CE Amplifier for low frequency & High frequency response for sinusoidal & square wave input.
6. Analyze & Design LPF, HPF, Clipper, Clampers, Multipliers

Course Contents

Unit No: 1 Wave Shaping Circuits: **08 Hrs**

Low pass & high pass RC circuits (analysis for square,step, ramp, exponential input), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: diode clippers, transistor clippers, Transfer characteristics, Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits, and voltage multipliers.

Unit No: 2 Unregulated Power Supplies: **08 Hrs**

Rectifiers: Half wave, full wave: center tap and bridge type, analysis for different parameters: PIV, TUF, efficiency, ripple factor, regulation, form factor etc. Filters: Need of filters, Types: capacitor, inductor, LC, CLC, and Analysis for ripple factor. Design of unregulated power supply with filterusing full wave rectifier.

Unit No: 3 Voltage Regulators : **08 Hrs**

Need of voltage regulator, Stabilization factors, Analysis & Design of Shunt regulator (using Zener diode & BJT),emitter follower regulator, series pass voltage regulator (using BJT), Pre- regulator & Overload protection circuit.

Unit No: 4 BJT & FET Biasing **08 Hrs**

Introduction to BJT, Need of Biasing, Generalized stability factor derivation, Biasing of CE configuration-Fixed Bias, Collector to Base Bias & Voltage Divider Bias (Analysis & Design of the same with & without Re). Introduction to JFET,Biasing of CS configuration- Fixed Bias, Self Bias (Analysis & Design of the same).MOSFET- EMOSFET & DMOSFET (Working & Characteristics)

Unit No: 5 Voltage Amplifiers: **08 Hrs**

H-Parameters, Hybrid model for transistor (CE, CB& CC configuration), amplifier equations for Voltage Gain, Current gain, Input resistance & Output resistance taking Rg of source into account.(Numericalare expected)

Unit No: 6 Frequency Response of Single Stage RC Coupled Amplifier: **08 Hrs**

Low frequency response: Effect of emitter bypass capacitor(CE) & Coupling capacitor(CC), Amplifier response to square wave, percentage Sag calculation, (Numerical are expected)

High frequency response: Hybrid π model , Derivation for CE short circuit &resistivecurrentgain,βcutoff,αcutofffrequency,amplifier highfreq.responsetosquarewave,gainbandwidthproduct,

(Numericalare expected). Design of single stage RC coupledamplifier.

Text Books:

1. Electronic devices & circuits, Allen MottershedPrentice- Hall India
2. Electronic devices & circuits, J. Millman & C.Halkias,Tata McGraw HillPublication
3. A Monograph on ElectronicsDesignPrinciplesN.C. Goyal & R.K. Khetan-Khanna Publishers
4. Pulse digital and switchingcircuitsMillman Taub,Tata MCGraw hill 2nd edition

Reference Books:

1. Electronic devices & circuits,David A. Bell ,Oxford University
2. Electronic devices & circuits', Salivahanan, N Sureshkumar, Tata McGraw HillPublication
3. Electronic devices & circuittheory, Robert L. Boylsted, LouisNashelsky,Pearson Education

List of Experiments (Minimum 08 experiment + 01 Simulation + 01 Mini Project compulsory):

1. Design and study of Low pass filter a.Frequency response (sinusoidal)
   b. integrator (Square wave input)
2. Design and study of High pass filter a.Frequency response (sinusoidal)
   b. Differentiator (Square wave input)
3. Study of different types of clipper circuits.
4. Study of different types of clamping circuits.
5. Design and analysis of full wave rectifier with capacitive filter.
6. Design and analysis of full wave rectifier with inductive filter.
7. Design and analysis of zener shunt regulator
8. Design and analysis of transistorized shunt regulator
9. Design and analysis of emitter follower regulator
10. Design and analysis of series pass voltage regulator
11. Determination of H-parameter for CE configuration using input and output characteristics.
12. Simulation of FWR using C-filter
13. Simulation of Single stage RC-Coupled Amplifier
14. Mini Project (PCB Design)
    a. Design of FWR (Different output voltages for different groups)with C filter.
    b. Design of Single Stage RC Coupled Amplifier (Different voltage Gain for different groups).

Guidelines for Paper Setter: 70 marks.

Q.1. 10 MCQ's based on complete syllabus. (10 Marks)

Q.2 & Q. 3 Based on unit no 1,2,3 (Each carries 15 marks)

Q.4 & Q. 5 Based on unit no 4,5,6 (Each carries 15 marks)

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

3. Network Analysis

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-302-Network Analysis
Prerequisites	**Fundamentals of Network Elements**
Teaching scheme: Lecture/Practical/ Tutorial	**4/0/1**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial : 01Hr /week		TW: 25 Marks

CourseObjectives:
The course aims to:

1 To understand basic theorems used for network analysis.
2 To understand two port networks and its parameters
3 To understand series and parallel resonance and its effects
4 To understand system behavior using pole zero plot
5 To understand and implement filter approximations

Course Outcomes:

CourseOutcomes:
Upon successful completion of this course, the student will be able to:

1 Analyze AC and DC circuits using different network Theorems and Apply graph theory to solve network equations
2 Identify and analyze the series, parallel resonance circuits, calculate the bandwidth, selectivity factor also
3 Evaluate two port parameters and Understand network transfer functions in s-domain
4 Analyze and design prototype LC filters.
5 Evaluate initial conditions and solve differential equation for RL, RC, and RLC circuits and carry out transient analysis.

Course Contents

UnitNo: 1	**Network Fundamentals:** Network Elements & its types, Energy sources, KVL & KCL, series & parallel connection of passive elements(R,L,C) , Combination of energy sources ,Current Division & Voltage division, source transformation ,Star-Delta transformation, Mesh & Super mesh analysis, Node & super node analysis **Graph Theory:** graph of network & its parts, tree & co-tree, incidence matrix, Tie Set matrix, cut sets	**Hrs8**
UnitNo: 2	**Network Theorems:** Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, ReciprocityTheorem, Compensation theorem, Duality theorem, Millman's Theorem	**Hrs8**
UnitNo: 3	**Resonance :** Definition, Types: series & parallel resonance, Series resonance-resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to. Frequency, Effect of resistance on frequency response, Selectivity, B.W. &Quality factor. Parallel resonance–Ant resonance frequency, Resonant frequency for a tank circuit, variation of impedance &admittance with frequency, Selectivity, Quality factor. & B.W. Comparison of series and parallel resonant circuits.	**Hrs8**
UnitNo: 4	**Two Port Network & Network Functions:** **Two port network**: **Z, Y, ABCD , h** parameters, Interrelation of different parameters, Interconnections of port network (Series, Parallel, Cascaded, Series-Parallel) **Network Functions:** Network functions for one port & two port networks, Driving point impedance and admittance of one port network, Driving point impedance & admittance function, Transfer function Concept of complex frequency, significance of poles & zeros. Restrictions on poles& zeros for transfer& drawing point's function, Stability of circuit using Routh criterion, Pole zero diagram, Time response from pole zero plot.	**Hrs8**
UnitNo: 5	**Filters** Definitions, classification & characteristics of different filters, decibel & Neper. Filter fundamental such as attenuation constant (α),phase shift(β) propagation constant (γ) and characteristic impedance(Z_o) , Design & analysis of constant K, M derived (low pass, high pass, band pass & band stop filters): T & Pi sections.	**Hrs8**
UnitNo: 6	**Transient Response:** Network Solution using Laplace transforms, Initial Conditions of elements. Steady state & transient response (Voltage & Current) DC response of RL circuit DC response of RC circuit DC response of RLC circuit	**Hrs8**

Text Books:

1. A. Sudhakar ,ShyammohanS.Palli ‘Circuit & Network – Analysis & Synthesis’ IIIrd Edition – Tata McGraw Hill Publication
2. Ravish Singh, “Networks Analysis & Synthesis” Tata McGraw Hill Publication
3. A.Chakrabarti ‘Circuit Theory (Analysis & Synthesis)’ - IIIrd Edition DhanpatRai& co
4. William H Hayt, Jack E Kimmerly and Steven M.Durbin, Engineering Circuit Analysis, Tata McGraw Hill

Reference Books:

1. D. Roy Choudhury ‘Networks & Systems’ - New Age International Publisher
2. Soni Gupta ‘Electrical Circuit Analysis’ DhanpatRai& Co.
3. Boylestad ‘Introductory Circuit Analysis – Universal book stall, New Delhi
4. M.E.VanValkenburg ‘ Network Analysis’ – IIIrd Edition , Pearson Education / PHI
5. JosephEdministrar ‘Theory & Problems of Electronic Circuit (Schaum’s series) – Tata McGraw Hill, Publication
6. R.G .Kaduskar, S.O.Rajankar, T.S. Khatavkar, Network Fundamentals and Analysis – Wiley India

Note for Paper setter: 40% theory and 60% numerical are expected

Term Work: (Minimum 06 tutorials):

Minimum 06 tutorials based on above syllabus covering all units.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

4. Transducers and Measurements

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-303-Transducers and Measurements
Prerequisites	Knowledge of Fundamentals of Electronics and Computer course of F.Y.B.Tech
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: -----

CourseObjectives:

The course aims to:

1. Provide introduction to different types of Transducers with their classification, construction & application
2. Provide knowledge of different sensors and their applications
3. Provide knowledge of signal conditioning and instrumentation system
4. Provide basic knowledge of measurement system
5. Provide basic understanding of different Electronic instruments
6. Provide knowledge of different types of bridges

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Student will able to select appropriate transducer and sensors as per required.
2. Students will get acquainted with different DAS
3. Student will be able to design instrumentation system
4. Student will able to understand measurement basics and select proper instrument for particular measurement of electrical parameters.

Course Contents

UnitNo: 1	**Transducers :** Definition, Various Types of Transducers, Classification of Transducers, Selection Factors and General Applications of Transducers, Detailed Study of Transducers: (i) Motion, (ii) Flow, (iii) Pressure, (iv) Temperature, (v) Force and Torque, (vi) Sound Transducer, Hall Effect Transducers, Digital Transducers: Shaft Encoder, Digital Resolver, Digital tachometer	**7Hrs**
UnitNo: 2	**Sensors:** Proximity Sensors, optical Sensors, IR sensors, Piezo – electric sensors Smart Sensors: Fiber opticsensors, Film sensors, Nano sensors, Electrochemical sensors, biosensors, MEMS	**4Hrs**
UnitNo: 3	**Signal Conditioning & Data Acquisition System:** Introduction, AC & DC Signal Conditioning, Chopper Stabilized Amplifier, Instrumentation Amplifier, Isolation And Programmable Gain Amplifier, Grounding And Shielding, principles and working of different types of ADCand DAC Instrumentation Techniques:Introduction to Process Instrumentation, Instrumentation set up for measurement of nonelectrical quantity such as weight using strain gauge.	**7Hrs**
UnitNo: 4	**Introduction to Measurement:** Introduction,PerformanceCharacteristics,StaticCharacteristics,Errorin Measurement, Types of Static Error, Sources of Error, Dynamic Characteristics, Statistical Analysis, Electrical Standards, Atomic Frequency and Time Standards, Graphical Representation of Measurements as a Distribution, Digital voltmeters- Introduction, Types of DVM , general specifications of DVM, digital multimeter, digital measurements of time, digital frequency meter , Q meter, Instrument calibration	**7Hrs**
UnitNo: 5	**Measurement & Display Devices:** CRO: Dual Beam, Dual Traces Sampling, Digital storage, measurement of phase and frequency using Lissajous pattern, CRO probes: active, passive, current, attenuators, LED, LCD, Graphics Display, Signal Generators, Function generators. Spectrum analyzer, logic analyzer	**7Hrs**
UnitNo: 6	**Bridges:** Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge& Schering Bridge	**4Hrs**

Text Books:

1. A course in Electrical, Electronics measurement and Instrumentation, A.K.Sawhney
2. Electronic Instrumentation, H. S. Kalsi, MGH, 3rd Edition

Reference Books:

1. Electronic Instrumentation and Measurement Techniques, Welfrick Cooper.
2. InstrumeIntation for Engineers And Scientists , John Turner ,II Edition , Wiley
3. Electronic Instrumentation and Measurements, David A Bell, Third Edition, Oxford
4. Instrumentation for Engineering Measurements, James W Dally, II Edition , Wiley
5. Sensors And Transducers,Patranabis D., PHI, 1999
6. Smart Sensors For Industrial Applications, Krzystof Iniewski, CRC press, Tailor & Francis
7. Introduction to electrochemical transducer, Brian R Eggins, Willey

(for chapter 2: Electrochemical sensors, biosensors)

List of Experiments (Minimum 10):

1. Study of weight measurement using strain gauge
2. Study of displacement measurement using LVDT.
3. Study of temperature measurement using RTD PT100/LM 35
4. Study of temperature measurement using Thermistor
5. Study of temperature measurement using Thermocouple
6. Study of cathode ray oscilloscope & Measurement of amplitude and frequency using CRO
7. Measurement of phase and frequency by lissajous pattern using CRO.
8. Study of function generator
9. Study of spectrum analyzer
10. Study of AC bridges
11. Study of DC bridges
12. Study of Logic analyzer
13. Study of smart sensors

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

5.Analog Communication

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-304-Analog Communication
Prerequisites	Basics of baseband communication
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:

The course aims to:

The basic objective of this course is to introduce the students with analog communication, AM, FM modulation techniques, their analysis, bandwidth calculations.Italsofocusesontheperformanceanalysisofanalogcommunications systems under the presence of noise and finally introduces the pulse and digital modulation techniques.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Understandandidentifythefundamentalconceptsandvariouscomponentsofanalog communication systems.
2. Understand, analyze and explain various analog modulation schemes.
3. Understand the performance of analog communications systems under the presence of noise.
4. Develop the ability to compare and contrast the strengths and weaknesses of various communication systems
5. Analyze Basic communications systems and their performance under the presence of noise
6. Differentiate between various pulse modulation techniques

Course Contents

UnitNo: 1 **Amplitude Modulation:** **8Hrs**

Elements of electronic communication systems, Need for modulation, channel, frequency spectrum, time and frequency domain signals, Amplitude Modulation principles, AM envelope, frequency spectrum & BW, Modulation index, % modulation, AM transmitters: Block of low level DSBFC, High level DSBFC, Trapezoidal patterns Evolution and descriptions of SSB, Suppression of carrier using balanced modulator, Suppression of unwanted sideband, Methods: Filter system, phase shift & third method Vestigial sideband(VSB)

UnitNo: 2	**Angle Modulation:** Instantaneous frequency, Concept of angle modulation, frequency spectrum, Narrowband& WideBand FM, Modulation Index, Bandwidth, Phase modulation, Bessel,^{s} Function and its mathematical Analysis, Generation of FM (Direct and Indirect Method)	**6Hrs**
UnitNo: 3	**Noise:** Sources of noise, Types of noise White noise, shot noise, thermal noise, partition noise, low frequency or flicker noise, burst noise, avalanche noise,signal to noise ratio, Noise Figure, Noise Temperature, FRISS formula for noise figure	**4Hrs**
UnitNo: 4	**AM Receiver:** Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, dynamic range, Tracking, fidelity, Types of AM receiver: TRF and superheterodyne (block diagram), AM detection types: using diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, Demodulation of SSB Automatic Gain Control (AGC).	**6Hrs**
UnitNo: 5	**FM Receiver:** Double conversion FM receivers, block diagram, FM demodulator, tuned circuit frequency discriminators, slope detectors, fosters seeley discriminator, ratio detectors,PLL-FM demodulators, FM noise suppression	**6Hrs**
UnitNo: 6	**Pulse Modulation :** Introduction, Sampling theorem: Occurrence of allising error, PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery,; PWM: Uses of PWM, Genration of Analog W/F using PWM, PPM: Generation of PAM, Generation of PWM, Generation of PPM	**6Hrs**

Text Books:

1. George Kennedy, "Electronic Communications", McGraw Hill Kennedy.
2. WayneTomasi'ElectronicsCommunicationSystem'-FundamentalsthroughAdvanced.-Vth Edition- Pearson Education.
3. V. Chandra Sekar, "Analog Communication", OXFORD University press.

Reference Books:

1. B.P. Lathi, "Analog and Digital Communication", OXFORD University press.
2. Simon Haykin, "An introduction to analog & digital communications", John Wiley &Sons
3. RPSingh,SDSapre'CommunicationSystem-Analog&Digital'IIndEdition– TataMcGraw Hill Publication
4. Blake"Electronic Communication Systems",2nd Edition CENGAGE learning
5. Louis E. Frenzel, "Principals of electronic communication system", IIIrd Ed., TMH Pub

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Name of subject: Programming Lab-I

Course Details:

Class S.Y. B. Tech. Sem-III

Course Code & Course Title	PCC-ETC-305
Prerequisites	Computer fundamentals
Teaching scheme: Lecture/Practical	**2/2**
Credits	**3**
Evaluation Scheme CIE/ESE for Theory	

Teaching Scheme		**Examination Scheme**
Lectures: 2hrs /week		Theory : Marks
Tutorial - /week		
Practical : 2hrs /week		TW: 25 Marks POE: 50 Marks

Course Objectives:

The course aims to:

1 To understand how to design flowchart and algorithms for procedure oriented programs.

2 To develop programming skills using the fundamentals and basics of C Language, control structures and looping statements.

3 To enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

4 To design and implement programs using files handling and user defined types.

Course Outcomes:

Upon successful completion of this course

1 Student will be able to understand the basic concepts of procedure oriented programming language.

2 Student will be able to use the control statements, looping statements and functions concepts.

3 Student will be able to design programs using user defined functions and data type.

4 Student will be able to design & apply the skills for solving the engineering problems.

Course Contents

1. Programming Fundamentals,	Flow chart, Algorithm, Standard notations, Selection Procedure, Loops, Sub Algorithms, Compilers, Interpreters, The Library and Linking	04 Hrs
2. Introduction to C	Introduction to Constants, Variables, Data Types, Operators, Expressions, Structure of C Programming, Identifiers, Decision & Loop control statements	05 Hrs
3. Arrays and Structures	Arrays::Introduction to 1-Dimensional arrays, Declaration and Initialization of 1-Dimensional arrays, Declaration and Initialization of 2-Dimensional arrays, Declaration and Initialization of Multi-Dimensional arrays. Structures-Declaring of Structures, Accessing Structure elements, arrays of structures.	04 Hrs

4.	Functions and Pointers	Introduction of functions, Need for functions,, Multifunction Programming, Elements of functions, Definition and declaration of functions, return values and their types, function call, arguments, return value, nesting and recursion Pointers- Introduction to pointers, pointer variables, Declaration and initialization of pointer variable, accessing pointer	05 Hrs
5.	Strings	Declaration and Initialization of string, Reading from Terminal, Writing to screen, Standard library string functions	03 Hrs
6.	File handling	File operation, counting character tabs, spaces ,file copy program, file opening modes, text file- binary file, Real time case study.	03 Hrs

Text Books:

1 **Let Us C Yashawant Kanetkar, 13th Edition BPB Publications (unit II, VI)**

2 **Programming in ANSI C , E Balagurusamy, 5th edition, Tata Mc Graw Hill (unit III. IV, V)**

Reference Books:

1 **The C Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.**

List of Experiments (Minimum 10 + mini project):

1. Develop Program using decision control statements
2. Develop Program using control statements
3. Develop Program using loop control statements
4. Develop Program using functions
5. Develop Program using pointers
6. Develop Program using array
7. Develop Program using two dimensional arrays
8. Develop Program using structures
9. Develop Program using dynamic memory allocation
10. Develop Program using strings
11. Develop Program using any sorting technique
12. Develop Program using file handling.
13. Mini project

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Environmental Studies

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	MC-ETC-301-Environmental Studies
Prerequisites	Basic knowledge about natural process and fundamentals of environmental aspects.
Teaching scheme: Lecture/Practical	3 lectures/week
Credits	3**

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Electronic Circuit Design - II

Course Details:

Class	S.Y.B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-401-Electronic Circuit Design - II
Prerequisites	**Basic Circuit Law's, Single Stage RC coupled amplifier**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:

The course aims to:

1 Provideanintroductionandbasicunderstanding of feedbackamplifiers,poweramplifiers, oscillators,multivibrators

2 Developstudentabilitytoapplybasicengineeringsciencestounderstandtheoperation & analysis of electronic circuits using diodes, bipolar junction transistors and field effecttransistors

3 Provideanalogelectroniccircuitdesigntechniquesusingdiodes,bipolarjunction transistorsandfieldeffecttransistors,andtodevelopanalyticalskills.

4 Design electronic circuits to meet desired specifications.

5 Applyknowledgeofmathematics,science,andengineeringtodesign,analyzeand implement electroniccircuits.

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Analyze & Design Multistage Amplifier
2 Analyze & Design Feedback Amplifier
3 Analyze & Design Power Amplifier
4 Describe & Design Different types of Oscillators using BJT
5 Describe & Design Different types of Multivibrators using BJT
6 Describe & Design IC voltage Regulators

Course Contents

Unit No: 1	**Multistage Amplifiers** Need of cascading, Parameter evaluation such as Ri ,Ro, Av, Ai & bandwidth for general multistage amplifier, Design of two stage RC coupled, Direct coupled amplifier using BJT.	**7 Hrs**
Unit No: 2	**Feedback Amplifiers :** General theory of feedback, reasons for negative feedback. Analysis of Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers, Design of two stage Voltage series feedback amplifier.	**8 Hrs**
Unit No: 3	**Power Amplifiers:** Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic / nonlinear distortion, amplitude distortion using Three point method.analysis and design of Class A single ended transformer coupled amplifier& class A Push pull amplifiers, Class B amplifier & class B push pull amplifier , crossover distortion, class AB Push pull amplifiers.Complementary symmetry push pull power amplifier.	**10 Hrs**
Unit No: 4	**Oscillators:** Barkhausen's criteria, Frequency and amplitude stability,Classification, RC oscillators : analysis & design of RC phase shift & Wein bridge oscillator using BJT. LC oscillators: analysis & design of Colpit's & Hartely's oscillators using BJT, Crystal oscillator.	**9 Hrs**
Unit No: 5	**Multivibrators :** Transistor as a switch, Different transistor switching parameters,overdrive factor, classification of multivibrators, Analysis and design of collector coupled -Astable, Monostable,fixed bias and self-bias Bistable multivibrator and Schmitt trigger using BJT considering overdrive factor. Triggering circuits forMultivibrators	**9 Hrs**
Unit No: 6	**IC voltage regulator** Study and design of regulators using IC's :78XX, 79XX,LM723,LM317, LM337.	**5 Hrs**

Text Books:

1 A Monograph on ElectronicsDesignPrinciplesN.C. Goyal & R.K. Khetan- Khanna Publishers

2 Electronic devices & circuits, Allen MottershedPrentice- Hall India

3 Electronic devices & circuitsG. K. Mittal
4 Pulse digital and switchingcircuits,Millman Taub, Tata McGraw Hill

Reference Books:

1 Electronic devices & circuits,David A. Bell ,Oxford University
2 Electronic devices & circuits', Salivahanan, N Sureshkumar, Tata McGraw HillPublication
3 Electronic devices & circuittheory, Robert L. Boylsted, LouisNashelsky,Pearson Education

List of Experiments (Minimum 08 experiment + 01 Simulation + 01 Miniproject compulsory):

1. Design and frequency response of direct coupled amplifier.
2. Design and frequency response of two stage RC coupled amplifier.
3. Design and frequency response of voltage series feedback amplifier.
4. Design of transformer coupled class A amplifier.
5. Design of RC phase shift oscillator using BJT
6. Design of wein bridge oscillator using BJT
7. Design of colpitts oscillator using BJT
8. Design of hartley oscillator using BJT
9. Design of Astable multivibrator
10. Design of monostable multivibrator using BJT
11. Design of bistable multivibrator using BJT

12 Design of Schmitt trigger using BJT

13 Design of voltage regulator using LM317

14 Design of voltage regulator using IC723

15 Simulation of Oscillator

16 Simulation of Multivibrator

17 Miniproject (PCB Design)

   c. Design of Astable Multivibrator or Schmitt trigger.
   d. Design of Power Supply using IC voltage Regulator.

Guidelines for Paper Setter: 70 marks.

Q.1. 10 MCQ's Based on complete syllabus. (10 Marks)

Q.2 & Q. 3 Based on unit no 1,2,3 (Each carries 15 marks)

Q.4 & Q. 5 Based on unit no 4,5,6 (Each carries 15 marks)

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

2.Linear Integrated Circuits

Course Details:

Class	S.Y B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-402 Linear Integrated Circuits
Prerequisites	**Basic knowledge of electronics**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**4 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 04Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks POE: 50 Marks

CourseObjectives:
The course aims to:

1. Explain the internal circuit of operational amplifier and its parameters
2. Explain the application of Op-amps.
3. Design various Active filters.
4. Analyze and design of various wave generators

Course Outcomes:

CourseOutcomes:
Upon successful completion of this course, the student will be able to:

1. **Explain** operational amplifier with its parameters
2. **Classify** different configuration of op-amp
3. **Identify** and **explain** different applications of op-amp
4. **Design** and implement various filters
5. **Analyze** different waveform generator circuits
6. Apply knowledge of op-amp in various industrial applications

Course Contents

UnitNo: 1 **Introduction to op-amp** **9 Hrs**

Block diagram of op-amp in detail, Differential Amplifier configurations, Differential amplifier analysis (AC and DC) for dual-input balanced-output configuration, level shifter, current mirror circuits, ideal parameters and practical parameters of op-amp and their comparison.
(Numerical expected)

UnitNo: 2 **Op-amp configurations & frequency response** **6 Hrs**

Virtual ground concept, Open loop configuration, closed loop configuration, unity gain amplifier, frequency response of both configuration. slew rate equation

UnitNo: 3	**Applications of Op-amp** Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier, V to I & I to V Converter, Precision Rectifiers, Log & Anti-log Amplifiers, Study of comparator, Schmitt Trigger, Window Detector, Peak Detectors, Sample & Hold Circuits.	**9 Hrs**
UnitNo: 4	**Active Filters** Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter (Numerical expected)	**9 Hrs**
UnitNo: 5	**Waveform Generators** Analysis & Design of Square wave generator, Triangular wave generator, Sawtooth wave generator. Analysis & Design of RC phase shift oscillator, RC wein bridge oscillator, Colpitts oscillator, Hartley oscillator.	**7 Hrs**
UnitNo: 6	**Industrial applications of special OPAMP ICs** Introduction , block diagram, operating principal and applications of IC 555,IC 565,OP177,AD620	**7 Hrs**

Text Books:

1. Ramakant A. Gaikwad, "Op Amps and Linear Integrated Circuits", Pearson Education second and latest edition

Reference Books:

1. David Bell, "Operational Amplifiers and Linear ICs",Third ed, Oxford University Press
2. Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth edition,PE, 2006. (Ch-6)
3. B. Somanathan Nair, "Linear Integrated Circuits- Analysis, Design & Applications", Wiley India.
4. Datasheets

List of Experiments

1. Design of inverting , noninvertion amplifier & their frequency response
2. Design of Summing, scaling, and averaging amplifier
3. Design, build and test precision half & full wave rectifier
4. Design, build and test Comparator and Schmitt trigger
5. Design of Butterworth filters
6. Design, build and test square & triangular wave generator.
7. Design, build and test Integrator and Differentiator
8. Design and implement oscillator using Op-Amp.

Note: one small project based on OPAMP applications

3. Control System Engineering

Course Details:

Class	B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-403 Control System Engineering
Prerequisites	
Teaching scheme: Lecture/Practical/Tutorials	**3/0/1**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial: 01 Hr /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1 To provide an introduction and basic understanding of Control System

2 To develop time & frequency domain analysis

3 To analyze & compare different control systems

4 To understand the concept of stability & state space variables

Course Outcomes:

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Apply knowledge of mathematics, science, and engineering to design, analyze and control the different systems

2 Explain time & frequency domain analysis for different control systems

3 Demonstrate & compare different control systems

4 Describe state variables

5 Design model for control system

Course Contents

Unit No: 1 **Introduction :** **7 Hrs**

Need & classification of control system, Effects of feedback, Mathematical models – (Mechanical & Electrical systems) Differential equations, Transfer function , Block diagram algebra – Block diagram reduction, Representation by Signal flow graph – Reduction using Mason's gain Formula.

Unit No: 2 **Time Response Analysis :** **6Hrs**

Standard test signals – Time response of first& second order systems – Design specifications of 2nd order system & error compensation, Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications, Steady state response – Steady state errors and error constants.

Unit No: 3 **Stability Analysis In S-Domain** **6 Hrs**

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique**:** The root locus concept – construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root locus.

Unit No: 4 **Frequency Response Analysis** **7 Hrs**

Introduction, Frequency domain specifications-Bode plots, Determination of Frequency domain specifications and transfer function from the Bode Plot – Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability Criterion, Nyquist plot & stability analysis.

Unit No: 5 **Compensators** **6Hrs**

Compensation techniques –Lag, Lead, Lead-Lag Controllers design in frequency Domain, Design of PID control system.

Unit No: 6 **State Space Analysis** **4 Hrs**

Concept of state, state variable & state model, state model for linear continuous time systems, Decomposition of Transfer Function,Transfer function from state model, Computation of state transition matrix, Controllability & Observability

Text Books:

1. Control Systems Engineering, I .J. Nagrath and M. Gopal, 5thEdition, Anshan Publishers.
2. A.Anandkumar,"Control System Engineering "PHI Publication 2nd edition
3. R.Aanandnatarajan,P.rameshbabu,"Control System Engineering",Scitech Publications.

Reference Books:

1. Norman S Nise "control system engineering"8th edition ,Wiley Publication
2. Sanarjjet Ghosh ,"Control system theory & application " 1st edition Pearson Education.

Note: Per Unit Two Tutorials

Note for Paper setters: Theory 40%

Numerical, Design &Derivations 60%

4. Digital Communication

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-ETC-404- Digital Communication
Prerequisites	Analog communication
Teaching scheme: Lecture/Practical	**3/2**
Credits	**3 + 1**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Practical : 02 Hrs /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1. Study the random signal theory with its mathematical analysis base.
2. Understand the concept of information theory in detail with different coding theorems.
3. Elaborate the different source coding techniques with the help of their block diagrams and function.
4. Explain the different digital modulation techniques.
5. Describe the baseband transmission and reception system.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1. Describe the probability of random signal
2. Solve the problem based on information theory
3. Classify different source coding technique
4. Explain different line coding techniques.
5. Compare different digital modulation technique

Course Contents

UnitNo: 1 **Probability Theory:** **6Hrs**

Introduction to digital communication system, probability and sample space, Bayes‟ rule, Joint & conditional Probability, PDF & CDF, Statistical averages

UnitNo: 2	**Information Theory:** Measure of Information, Entropy, Information Rate, Shannon's encoding theorem, communication channels –Discrete & Continuous, Shannon–Hartley theorem, Huffman's coding & Shannon-Fanno Coding techniques.	**7Hrs**
UnitNo: 3	**Source Coding:** Quantization–Uniform, Non-Uniform. Study of PCM, DPCM, ADPCM, DM, ADM	**5Hrs**
UnitNo: 4	**Digital Carrier Line Encoding :** Line codes: Unipolar, Bipolar, NRZ, RZ, RZ-AMI, Manchester Baseband pulse Shaping, Duo binary	**5Hrs**
UnitNo: 5	**Bandpass Modulation Techniques:** ASK, FSK, PSK, DPSK, QPSK, & QAM. Coherent, Non- Coherent detection. Introduction to Spread Spectrum techniques: DSSS, FHSS.	**7Hrs**
UnitNo: 6	**Baseband Transmission Of Digital Signals:** M-arySignaling, eyediagram, ISI, scrambler, Unscramble.OptimumReceivers-MatchedFilters,Correlationreceivers, Optimum detection using ML criteria.	**6Hrs**

Text Books:

1. K. Sam Shanmugam–Digital & Analog Communication (John Wiley)
2. Simon Haykin – Digital Communication(Wiley)
3. Communication Systems, Singh Sapre, TMH

Reference Books:

1. Wayne Tomasi- Electronic communications Systems, fifth edition, Pearson publication

List of Experiments (Minimum-8):

1. Perform PCM–TDM.
2. Perform Compander.
3. Perform DPCM.
4. Perform ADPCM.
5. Perform DM
6. Perform ADM.
7. Perform CVSD.
8. Perform ASK,FSK&PSK.
9. Perform QPSK.
10. Perform Spread Spectrum techniques.
11. Perform Eye Diagram using oscilloscope
12. Experiments on digital modulation techniques using MATLAB/Simulink Software.

5. Data Structures

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-405 Data Structures
Prerequisites	Knowledge of Mathematics, Computer Resources.
Teaching Scheme: Lecture/Practical/Tutorial	3/0/1
Credits	3 + 1
Evaluation Scheme CIE/ESE for Theory	30/70

Teaching Scheme		**Examination Scheme**
Lectures : 03 Hrs /week		Theory : 100 Marks
		70 (ESE) + 30(CIE)
Tutorial: 01Hr /week		TW: 25 Marks

CourseObjectives:

The course aims to:

1 Provide basic concept of data structure & it's types.
2 Provide the knowledge of arrays & records as well as relevant operations on it.
3 Provide the knowledge of linked list & relevant operations on it.
4 Provide the concept of stacks, queues & it's applications.
5 Provide the knowledge of various types of trees & relevant operations.
6 Provides the Knowledge of Graphs & Hashing techniques.

CourseOutcomes:

Upon successful completion of this course, the student will be able to:

1 Elaborate the basic concept of data structure & it's types.
2 Design and Implement the various algorithms on arrays & records.
3 Implement algorithms on linked list.
4 Understand the concept of stacks, queues & its applications.
5 Construct various types of trees & their applications.
6 Understand the concept of Graph & Hashing.

Course Contents

UnitNo: 1 Introduction & Overview: **(02 Hrs)**

Introduction to theory of data structures, data types, Classification of data structure, Algorithms: complexity, time space trade-off with example.

UnitNo: 2 **Arrays, Records & Pointers:** **(06 Hrs)**

Introduction, linear arrays, representation of linear array in memory, Algorithm for traversing linear arrays, inserting & deleting,
Sorting: bubble sort, searching: linear search, binary search,
Multi-dimensional arrays, Pointers: pointer arrays, Records: Record structures, representation of records in memory, parallel arrays, matrices, sparse matrices.

UnitNo: 3 **Linked Lists:** **(06 Hrs)**

Introduction, linked lists & its representation, Traversing & searching a linked list, memory allocation, Garbage collection, insertion & deletion of nodes of linked list, header linked list, two-way lists.

UnitNo: 4 **Stacks & Queues:** **(07 Hrs)**

Introduction to stacks, stack as an Abstract Data type, representation through Arrays & linked lists, arithmetic expressions, polish notation, Applications of stacks, stacks & recursion, Queue, representation of queue as an array and as a linked list, circular, double ended, priority, application of queues.

UnitNo: 5 **Trees :** **(07 Hrs)**

Binary Tree: introduction, types, definition, properties, representations, operations, binary tree traversal, reconstruction, counting number of binary trees, applications.
Advanced trees : AVL trees or height balanced trees, representation operation, Threaded binary trees, Expression trees. Multi way trees: trees, multi way search trees, B+ trees, Heaps, construction of a Heap.

UnitNo: 6 **Graphs &Hashing**: **(08 Hrs)**

Introduction, Graph theory terminology, sequential representation of graphs: Adjacency Matrix, Path matrix, Warshall's Algorithm, shortest paths, linked representation. Operations, Traversing, Posets, Topological sorting. Hashing, Hash functions, collision, chaining

Minimum Ten Tutorials Based on above syllabus

Text Books:

1	Data structure using C By ISRD group, published by Tata McGraw Hill
2	Data structures by Seymour Lipschutz, published by Tata McGraw Hill

Reference Books:

1	Data structure & algorithm analysis in C by Mark Allen Weiss published by Pearson Education (LPE)
2	Introduction to Data structure in C by A.N. Kathie published by Pearson Education (LPE)

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Name of Subject: Programming Lab-II

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-ETC-406
Prerequisites	Computer fundamentals
Teaching scheme: Lecture/Practical	**2/2**
Credits	**3**
Evaluation Scheme CIE/ESE for Theory	

Teaching Scheme		**Examination Scheme**
Lectures: 2hrs /week		Theory : Marks
Tutorial - /week		
Practical :2hrs /week		TW: 25 Marks POE: 50 Marks

Course Objectives:

The course aims to:

1. To understand features of object-oriented programming and design C++ classes
2. To understand how to overload functions and operators in C++.
3. To learn how to implement copy constructors and class member functions.
4. To learn how inheritance and virtual functions implement dynamic binding with polymorphism.
5. To learn how design inheritance for code reuse in C++.
6. To learn how to design and implement generic classes with C++ templatesand exception handling

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Student will be able to understand the basic concepts of procedure oriented programming language.
2. Student will be able to use the class, objects, function and operator overloading concepts
3. Student will be able to understand and implement the concept of inheritance, template and exception handling applications
4. Student will be able to design & apply the skills for solving the engineering problems.

Course Contents		
UNIT 1	**Introduction To Object Oriented Programming** Difference between procedure oriented programming and object oriented programming, basic concepts and features of object oriented programming, structures and classes, declaration of class, member functions, defining the object of class, accessing member of class, array of class objects**.**	**04**
UNIT : 2	**Overloading** Function overloading, assignment operator overloading, binary operator overloading, unary operator overloading.	**04**

UNIT : 3	**Constructors And Destructors** Constructors- copy constructor, default constructors, destructors, inline member function, friend function, dynamic memory allocation.	**04**
UNIT : 4	**Polymorphism** Polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions, abstract base classes, constructor under inheritance, destructor under inheritance, virtual destructors, virtual base classes.	**04**
UNIT : 5	**Inheritance** Introduction, Single Inheritance, Types Of Base Classes- Direct, Indirect, Array Of Class Object And Single Inheritance, Multiple Inheritances.	**04**
UNIT : 6	**Template And Exception Handling** Function template, class template, exception handling.	**04**

Text Books:

1 Programming with C++ D Ravichandran, II edition, Tata Mc Grow Hill

2 Object oriented Programming with C++, E Balagurusamy, Mc Grow Hill

Reference Books:

1 The C++ Programming Language, Brian W. Kernighan, Dennis M. Ritchi , IInd edition, Prentice Hall of India.

List of Experiments (Minimum 10 + mini project):

1. Develop a Program for implementation of array
   a) One-dimensional array
   b) Multi-dimensional array
2. Develop a Program for implementation of classes and Objects.
3. Develop a Program for implementation of types of constructor
   a. Default constructor
   b. Parameterized constructor
   c. Copy constructor
4. Develop a Program for implementation of polymorphism
5. Develop a Program for implementation of Friend Functions in Class
6. Develop a Program for implementation of types of inheritance
   a. Single level Inheritance
   b. Multi-level Inheritance
   c. Multiple Inheritance
   d. Hybrid Inheritance
   e. Hierarchical inheritance
7. Develop an Object oriented Program to Insert the Number in an Array
8. Develop an Object oriented program to Delete the Number in an Array
9. Develop an Object oriented program on Bubble Sort
10. Develop an Object oriented program to Perform Linear or binary search
11. Develop an Object oriented program to Insert and delete a Node in Link List
12. Develop an Object oriented program to implement stack using linked list.
13. Mini project.