SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech) CBCS

ELECTRONICS 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-EN301	Engineering Mathematics-III	3	4
2	PCC-EN-301	Electronic CircuitDesign-I	3	5
3	PCC-EN302	Linear Circuits	3	5
4	PCC-EN303	Electronic Measurement & Instrumentation	3	4
5	PCC-EN304	Analog Communication	3	4
6	PCC-EN305	Programming Lab-I	3	3
7	MC-EN-301	Environmental studies	3	3**
Total				**25**

**over and above credit

SEMESTER IV

Sr. No	Code No.	Subject	Semester	Credits
1	PCC-EN401	Electronic Circuit Design-II	4	5
2	PCC-EN402	Linear integrated Circuits	4	5
3	PCC-EN403	Control System Engineering	4	4
4	PCC-EN404	Digital Communication	4	4
5	PCC-EN405	Data Structures	4	4
6	PCC-EN406	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 ENGINEERING – CBCS PATTERN

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
SEMESTER – III																					
1	BSC-EN 301	3	3	3	1	1	1	-	--	-		CIE	30	100	40	As per BOS Guidelines	-	-	2	25	10
												ESE	70								
2	PCC-EN 301	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
3	PCC-EN 302	4	4	4	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
4	PCC-EN 303	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
5	PCC-EN 304	3	3	3	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
6	PCC-EN 305	2	2	2	-	-	-	1	2	2		-	-	-	-		50	20	2	25	10
7	MC-EN 301	3	3	3								CIE	30	100	10						
												ESE	70		30						
		19	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**600**			**150**			**150**	
SEMESTER –IV																					
1	PCC-EN 401	4	4	4	-	-	-	1	2	2		CIE	30	100	40	As per BOS Guidelines	50	20	2	25	10
												ESE	70								
2	PCC-EN 402	4	4	4	-	-	-	1	2	2		CIE	30	100	40		50	20	2	25	10
												ESE	70								
3	PCC-EN 403	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
4	PCC-EN 404	3	3	3	-	-	-	1	2	2		CIE	30	100	40		-	-	2	25	10
												ESE	70								
5	PCC-EN 405	3	3	3	1	1	1	-	-	-		CIE	30	100	40		-	-	2	25	10
												ESE	70								
6	PCC-EN 406	2	2	2	-	-	-	1	2	2		-	-	-	-		50	20	2	25	10
		-	-	-	-	-	-	-	-	-											
	TOTAL	**19**	**19**	**19**	**2**	**2**	**2**	**4**	**8**	**8**				**500**			**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 : **51**
• 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 external practical /oral courses.	

Note:

1. **BSC-EN**: Basic Science Course- Electronics Engineering are compulsory.
2. **PCC-EN:** Professional Core course –Electronics Engineering are compulsory.

3. **MC-EN:** Mandatory Course**:**Environmental Studies is compulsory for theory 70 Marks and Project Work 30 Marks.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

ENGINEERING MATHEMATICS-III

Course Details

Class	**S Y B Tech Sem - III**
Course Code and Course Title	**BSC-EN-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 VidyarthiGrahPrakashsn)

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).

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

ELECTRONICS CIRCUIT DESIGN-I

Course Details:

Class	S.Y. B. Tech. Sem-III
Course Code & Course Title	PCC-EN301
Prerequisites	**Fundamentals of Electronics**
Teaching scheme: Lecture/Practical	**4/2**
Credits	**5**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures: 4hrs /week	Theory: 100 Marks
Tutorial: ---	70 (ESE) + 30(CIE)
	TW: 25Marks
Practical: 2hrs/week	POE: 50Marks

CourseObjectives:

The course aims to:

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

Course Outcomes:

CourseOutcomes:

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

1. Analyze and design electronic circuits such as rectifiers, voltage regulators and transistorized amplifiers.
2. Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic devices and circuits.
3. Explain basic analog electronic circuit design techniques using diodes and bipolar junction transistors.
4. Explain the hybrid model of transistor and analyze the transistor amplifier (CE, CB, CC) using h-parameters.

Course Contents

1	**UNIT-I: Unregulated Power Supply** Analysis of rectifiers: Half wave, full wave: center tap and bridge type, parameters: PIV,TUF, efficiency, ripple factor, regulation, form factor etc. Design of Rectifiers. Filters: Need of Filters, Types of Filters: Capacitor, Inductor, LC and CLC filters, Analysis of above Filters for ripple factor & Regulation. Design of unregulated power supply using FWR with all types of filters. (Numerical & Design based examples are expected.	**8**
2	**UNIT-II: Regulated Power Supply** Need of Voltage Regulator, Stabilization factor, Analysis & Design of Shunt regulator (using Zener diode & BJT), Emitter follower regulator, series voltage regulator (using BJT), Series voltage regulator with Pre-regulator, Short circuit& Overload protection circuit.)(Numerical & Design based examples are expected)	**8**
3	**UNIT-III: Wave shaping circuits** Linear and Nonlinear waveshaping, High Pass filter (Differentiator) & Low Pass Filter (Integrator). Nonlinear wave shaping circuit: study and analysis of clipping and clamping circuits.Study of voltage multiplier: Doubbler, Trippler (half wave and full wave type) (Numerical & Design based examples are expected)	**7**
4	**UNIT-IV: BJT Amplifiers** Analysis of different biasing circuits (fixed bias, collector to base bias & voltage divider bias), General expression for stability factor, stability factor for all biasing circuits, compensation techniques (Thermistor and diode compensation) . (Numerical & Design based examples are expected)	**7**
5	**Unit V:- H Parameters** H-Parameters, Hybrid model for transistor (CE,CB & CC configuration),analysis of amplifier for Voltage gain, Current Gain, Input Resistance and Output Resistance in terms of h-parameters, Design of single stage RC coupled amplifier.(Numerical & Design based examples are expected)	**7**
6	**UNIT-VI : Field Effect Transistor** JFET: Types, Construction, operation, V-I Characteristics, Parameters of JFET, Biasing of JFET, analysis of Common Source Amplifier (CS) amplifier. MOSFET: Configuration, construction and operation of different MOSFET (NMOS, PMOS), Transfer Characteristics, Comparison of FET , BJT & MOSFET. (Numerical are expected)	**8**

Text Books:

1. A Monograph on Electronic design principles- N. C. Goyal, R. K. Khetan
2. Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, A vallavaraj.

3 Pulse, Digital & Switching Waveforms- Millman, Taub, Rao.

Reference Books:

1 Electronic Devices and Circuits- Allen Mottershead- PHI

2 Electronic Devices and Circuits- Anil K. Maini, VarshaAgarwal- Wiley India

3 Electronic Devices and Circuits- David Bell- Oxford publication

List of Experiments (Minimum 10):

1. Design of Low pass filter
   a.Frequency response (sinusoidal) b. integrator (Square wave input)
2. Design 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 of full wave rectifier with capacitive filter.
6. Design of full wave rectifier with CLC filter.
7. Design of zener shunt regulator
8. Design of transistorized shunt regulator
9. Design of emitter follower regulator
10. Design of series pass voltage regulator
11. Determination of H-parameter for CE configuration using input and output characteristics.
12 Design and frequency response of single stage RC coupled amplifier.

Note for Paper Setter: Question Paper Contains 50% theory and 50% numerical & Design.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

LINEAR CIRCUITS

Course Details	
Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-EN302
Prerequisites	1. Knowledge of basic Electronics components. 2. Fundamentals of Electronics and Physics.
Teaching Scheme: Lecture/Practical/ Tutorial	**4/0/1**
Credits	**5**
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 and analyze the basic AC and DC circuits
2. To characterize two port network in terms of network parameters
3. To understand the network functions, pole and zero concept
4. To identify and analyze filters and resistive attenuators

Course Outcomes:

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

1. Analyze the basic AC and DC circuits using KVL, KCL and network theorems
2. Derive two port network parameters
3. Understand, formulate network function and significance of poles and zeros
4. Design proto type, m-derived and composite filter

Course Contents

Unit No: 1 **Network Fundamentals & Topology:**Passive Network, Active Network, Linear Element, non-linear elements, Unilateral, bilateral, lumped &distributed elements, Representation of voltage & current sources.(Ideal & practical) , source transformation, series &parallel connection of passive elements(R,L,C), Star- Delta transformation, Mesh analysis, Node analysis.(DC & AC analysis), Graph Theory: Network graph, tree, co-tree & loops, incidence matrix, tie set & cut set matrix, Principle of duality. **08 Hrs**

Unit No: 2 **Network Theorems**: Superposition Theorem, Millman's Theorem, Compensation Theorem Norton's Theorem, Thevenin's Theorem, Maximum Power Transfer Theorem, and Reciprocity Theorem. .(DC & AC analysis) **08 Hrs**

Unit No: 3 **Resonance:** **08 Hrs**
Definition, Types: series & parallel resonance. Series resonance- resonant frequency, Impedance and phase angle of series resonant circuit, current & voltage across L & C w.r.t. frequency, Effect of resistance on frequency response, Bandwidth and Selectivity, Quality factor and its effect on bandwidth, Magnification Parallel resonance – Anti resonance frequency, variation of impedance & admittance with frequency, Qfactor and reactance curves, Magnification

Unit No: 4 **Two port network:** **08 Hrs**
Open circuit impedance (Z) parameters, Short circuit admittance (Y) parameters,Hybrid (H) parameter, Transmission parameters(ABCD), Interrelation of different parameters, Interconnections of two port network (Series, Parallel, Cascaded, Series- Parallel):T & Π representation .

Unit No: 5 **Network Functions:** **08 Hrs**
Concept of complex frequency, Network functions for one port & two port networks, significance of poles & zeros. Properties and necessary condition for driving point functions, Properties and necessary condition for Transfer functions, Time domain response from pole and zero plot

Unit No: 6 **Filters & Attenuators:** **08 Hrs**
Filters Definitions, classification, characteristics of different filters: attenuation constant (α) , phase shift (β) propagation constant (γ) characteristic impedance (Zo) , the relation between decibel &Neper.
Design & analysis of constant K, (low pass, high pass, band pass & band stop filters): (T & Π sections.)
Design & analysis of M derived (LPF & HPF) & composite filters (T & Π sections.) Attenuators - Definitions, classification, Analysis & design of T type, Π type , α Lattice , bridged- T & L types attenuators Equalizer: Inverse network, series and shunt equalizer.

Text Books:

1. A. Sudhakar, ShyammohanS.Palli ,"Circuit & Network – Analysis & Synthesis" McGraw Hill
2. AbhijitChakrabarti, "Circuit Theory, Analysis and Synthesis" ,DhanpatRai and sons
3. D. Roy Choudhury,"Networks & Systems" , Wiley Eastern Ltd.

S. Sivanagaraju, G. Kishor, "Electrical Circuit Analysis",Cengage Learning

Reference Books:

1. M.E.VanValkenburg,"Network Analysis" - IIIrd Edition , Pearson Education / PHI
2. SoniGupta,"Electrical Circuit Analysis",DhanpatRai& Co.
3. C P Kuriakose, "Circuit Theory" ,PHI publication

R G Kaduskar, S O Rajankar, " Network Fundamental and Analysis" ,Wiley India

***Note for Paper Setter:**

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- Question paper shall consist of approximately 60% Numerical problems & approximately
- 40% theory should be covered.
- While drawing question paper set more weightage should be given to d.c circuit analysis
- Numerical for a.c source and dependent source should be exercised during tutorial sessions.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS ENGINEERING DEPARTMENT

ELECTRONIC MEASUREMENT & INSTRUMENTATION

Course Details:

Class	S Y B. Tech. Sem-III
Course Code & Course Title	PCC-EN303
Prerequisites	
Teaching Scheme: Lecture/Practical	**3/2**
Credits	**4**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures 3 HRS /week	Theory : 100 Marks
Tutorial -- /week	70 (ESE) + 30(CIE)
	TW: 25Marks
Practical : 2 HRS /week	POE: --

CourseObjectives:

The course aims to:

1. To understand the working of basic measurement system and sources of errors in Measurement system.
2. To study static and dynamic characteristics of instrument.
3. To study the operation & applications of different testing & measuring instruments.
4. To understand the working principle of sensors and transducers.
5. To study the operation & design of bridge circuit.
6. To study the operation of DAS & data convertors.

Outcomes

Course Outcomes:

CourseOutcomes:

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

1. Student will able to understand the principle of operation of generalized measurement system and different sources of errors in measurements.
2. Student will able to understand static & dynamic characteristics of instrument & based on this will able to select particular instrument for measurement
3. Student will able to use testing & measuring instrument for measurement.
4. Student will able to understand principle of operation of different sensors and transducers & will able to use the transducers for measurement of physical parameters.
5. Student will able to design bridge circuits.

Course Contents

Unit 1	**Introduction to Measurement & Instrumentation** Introduction, definition of measurement, definition of instrumentation, generalized block diagram of measurement system, different sources of errors in measurement, statistical analysis, calibration of instruments, performance characteristics of instruments – static characteristics, dynamic characteristics, and analysis of dynamic behavior of system, factors affecting on the selection of instrument for measurement.	**04**
Unit 2	**Testing & Measuring Instruments** Analogue Instruments- Introduction, types of analog instruments, PMMC, MI, solid state electronic instruments, ohmmeter. Digital Instruments- Digital Voltmeter- ramp type DVM, integrating type DVM, successive approximation type DVM, DFM, DMM, Digital Tachometer, Line mains frequency indicator.	**07**
Unit 3	**Oscilloscopes** Block diagram of oscilloscope, CRT, vertical deflection system, horizontal deflection system, CROprobes,CROmeasurement-measurement of electrical parameter-voltage, multi input oscilloscope-dual beam oscilloscope, dual trace oscilloscope, DSO, current, time period, frequency, phase,testing of electronic component.	**04**
Unit 4	**Signal Generators And Analyzers.** Signal generators- introduction, audio frequency generators, radiofrequency generators, pulse generators.Signal analyzers- introduction, Fourier analyzer, harmonicdistortion analyzer, spectrum analyzer, logic analyzer.	**04**
Unit 5	**Sensors and Transducers** Introduction, classification of transducer, thermistor, thermocouple, RTD, strain gauge, piezoelectric transducers, capacitive transducers, PH sensors & their signal conditioning.	**06**
Unit 6	**Bridges & Application** DC Bridges- Introduction, Wheatstone bridge, Kelvin's bridge. AC Bridges- Introduction, measurement of inductance-Maxwell's bridge, Hay,s bridge, Andersons bridge, measurement of capacitance- Schering bridge, wein bridge	**07**

Text Books:

1. A. D. Helfik , W. N. cooper, "Modern Electronic Instrumentation & Measurement Techniques", pearson education
2. A. K. Sawhney. "A Course In Electrical & Electronics Measurements & Instruments", DhanpatRai&sons publication.

Reference Books:

1. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication.
2. AlokBarua, "Fundamentals of industrial instrumentation", Wiley India publication.
3. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication.

List of Experiments (Minimum 10):

1. Study of CRO for measurement of electrical parameters.
2. Measurement of phase & frequency by Lissajeous pattern
3. Study of DSO.
4. Measurement of temperature using RTD Pt100.
5. Measurement of temperature using thermocouple.
6. Measurement of resistance using Wheatstone bridge.
7. Measurement of self-inductance using Maxwell's Bridge.
8. Study of harmonic distortion analyzer.
9. Study of Fourier analyzer
10. Study of function generator.
11. Measurement of capacitance using Schering Bridge.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

ANALOG COMMUNICATION

Course Details:

Class	S.Y.B. Tech. Sem-III
Course Code & Course Title	PCC-EN304-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 : 03 Hrs /week	Theory : 100 Marks 70 (ESE) + 30(CIE)
	TW: 25 Marks
Practical : 02 Hrs /week	POE: 50 Marks

CourseObjectives:

The course aims to:

1. To introduce the students with analog communication,
2. Study AM, FM modulation techniques, their analysis, bandwidth calculations.
3. Calculate performanceanalysisofanalogcommunications systems
4. Analyze presence of noise and finally introduces the pulse and digital modulationtechniques.

CourseOutcomes:

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

1. Identifythefundamentalconceptsandvariouscomponentsofanalog communicationsystems.
2. Discuss various analog modulation schemes.
3. The performance of analog communications systems under the presence ofnoise.
4. compare and contrast the strengths and weaknesses of variouscommunication systems
5. Explain the Basic concept of communications systems and their performance under the presence ofnoise
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, percentage 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, Vestigialsideband(VSB) in television system.

UnitNo: 2 **Angle Modulation:** **5Hrs**

Instantaneous frequency, Concept of angle modulation, frequency spectrum,Narrowband&WideBandFM,ModulationIndex,Bandwidth, Phasemodulation,Bessel'sFunctionandit'smathematicalAnalysis, Generation of FM (Direct and Indirect Method)

UnitNo: 3 **Noise:** **5Hrs**

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.

UnitNo: 4 **AM Receiver:** **7Hrs**

Simplified block diagram of AM receiver, receiver parameters: Sensitivity, Selectivity, dynamic range, Tracking, fidelity, Types of AM receiver:TRF and super-heterodyne (block diagram), AM detection types: using diode detector, distortion in diode detector. Negative peak clipping & diagonal clipping, Demodulation of SSB Automatic Gain Control (AGC).

UnitNo: 5 **FM Receiver:** **5Hrs**

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

UnitNo: 6 **Pulse Modulation :** **6Hrs**

Introduction, Sampling theorem: Occurrence of aliasing error, PAM: Channel BW for PAM, Natural Sampling, Flat-top Sampling, PAM & TDM, Signal Recovery,; PWM: Uses of PWM, Generation of Analog W/F using PWM, PPM: Generation of PAM, Generation of PWM, Generation of PPM

Text Books:

1. George Kennedy, "Electronic Communications", McGraw Hill Kennedy.
2. WayneTomasi'ElectronicsCommunicationSystem'-FundamentalsthroughAdvanced.-V th 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

List of Experiments (Minimum 08):

1. Practical implementation of Amplitude modulation anddemodulation.
2. CalculationofmodulationindexbygraphicalmethodofDSBFCsignal&measurement of power of AM wave for different modulatingsignal.
3. SSBmodulationusinganymethod(filtermethod,Phaseshiftmethod)anditsdetection.
4. Performance and analysis of AM system using trapezoidalmethod
5. Practical implementation of frequency modulation anddemodulation.
6. ExperimentonSamplingandreconstructionandalsoobservealiasingeffectbyvarying samplingfrequency.
7. PracticalimplementationofPAMsystem
8. Practical implementation of PWMsystem
9. Practical implementation of PAM-TDMsystems.
10. PracticalimplementationofPPMsystem
11. Envelope detector- Practical diodedetector.
12. Experiment on Pre-emphasis andDe-emphasis.
13. Visit toAIR

Note: 1.There should be compulsory one industrial visit related to this subject.

Note: 1.There should be compulsory one industrial visit related to this subject.

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 ENGINEERING DEPARTMENT

PROGRAMMING LAB-I

Course Details:

Class	S.Y. B. Tech. Sem-III
Course Code & Course Title	PCC-EN305
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	
	TW: 25Marks
Practical : 2hrs /week	POE: 50Marks

CourseObjectives:
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 YashawantKanetkar, 13th Edition BPB Publications (unit II, VI)

2 Programming in ANSI C , E Balagurusamy, 5th edition, Tata McGraw 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 ENGINEERING DEPARTMENT

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****
Evaluation Scheme Environmental Mini Project + ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures : 03 Hrs /week	Total : 100 Marks
	70 (ESE) + 30(Environmental Project report)

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

ELECTRONIC CIRCUIT DESIGN-II

Course Details:

Class	S. Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-EN401
Prerequisites	Fundamentals of Electronics,Electronic Circuit Design-I
Teaching scheme: Lecture/Practical	4/2
Credits	5
Evaluation Scheme CIE/ESE for Theory	30/70

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs/week	Theory : 100 Marks
Tutorial: -----	70 (ESE) + 30(CIE)
	TW: 25 Marks
Practical: 2 Hrs/week	POE: 50 Marks

CourseObjectives:
The course aims to:

1. Apply knowledge of mathematics, science, and engineering to design, analyze and operation of electronic circuits.
2. Provide an introduction and basic understanding feedback amplifiers, power amplifiers, oscillators, multivibrators.
3. Develop student ability to apply basic engineering sciences to understand the operation & analysis of electronic circuits using diodes, bipolar junction transistors and field effect transistors
4. Provide analog electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors, and to develop analytical skills.
5. Design electronic circuits to meet desired specifications.

Course Outcomes:

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

1. Analyse and design electronic circuits such as wave shaping circuits, multistage amplifiers, power amplifiers.
2. Explain basic analog electronic circuit design techniques using diodes, bipolar junction transistors and field effect transistors.
3. Demonstrate the analytical skills developed while designing the electronic circuits using diodes, bipolar junction transistors and field effect transistors.

4 Describe and design different types of oscillators and multivibrators as per given specifications and requirement using bipolar junction transistors and field effect transistors.

Course Contents

1	**Unit- I: Multistage Amplifier** Need of Cascading, evaluation of Ri, Ro, Ai,Av, Types of coupling, RC coupled, Transformer coupled, Direct coupled amplifier. Design of two stage RC coupled amplifier with and without feedback and Direct coupled amplifier. (Numerical & Design based examples are expected)	**7**
2	**Unit-II: Feedback Amplifier** Need & types of feedback, Advantages of negative feedback, types of negative feedback (Voltage series, Current series, Voltage shunt, Current shunt feedback amplifiers), study of Emitter follower and darlington amplifier with bootstrapping principle (Numerical are expected)	**7**
3	**Unit- III: Power amplifier** Need of Power amplifier, Classification of power amplifier, Power considerations, distortion in power amplifier (Phase, frequency, harmonics),calculation of IInd Harmonic or distortion using Three point method, Analysis & Design of Class A single ended transformer coupled amplifier, Class B amplifier & class B push pull amplifier, Cross over distortion and methods to eliminate cross over distortion, complimentary symmetry amplifier.(Numerical & Design based examples are expected)	**9**
4	**Unit- IV: Oscillator** Barkhausen's criteria, Frequency and amplitude stability, classification of oscillator, RC Oscillators: analysis and design of RC phase shift (Using BJT &FET), Weinbridge using BJT, LC Oscillators: Colpittsand Hartley oscillator using BJT. Study of Crystal oscillator. (Numerical & Design based examplesare expected)	**8**
5	**Unit- V: Multivibrator** Transistor as a switch, Transistor switching Parameters,Classification of Multivibrator, analysis and design of bistable (Fixed Bias & Self Bias), monostable&astablemultivibrator (Collector coupled), (Numerical& Design based examples are expected)	**8**
6	**Unit- VI: IC Regulators** Study and design of regulators using 78XX & 79XX, LM317, IC 723. (Numerical & Design based examples are expected)	**6**

Text Books:

1 A Monograph on Electronic design principles- N. C. Goyal, R. K. Khetan

2 Electronic Devices and Circuits- S Salivahanan, N Suresh Kumar, A vallavaraj.

3 Pulse, Digital & Switching Waveforms- Millman, Taub, Rao.

Reference Books:

1. Electronic Devices and Circuits- Allen Mottershead- PHI
2. Electronic Devices and Circuits- Anil K. Maini, Varsha, Agarwal- Wiley India
3. Electronic Devices and Circuits- David Bell- Oxford publication

List of Experiments (Minimum 10):

1. Design and frequency response of voltage series feedback amplifier.
2. Design and frequency response of direct coupled amplifier.
3. Design and frequency response of two stage RC coupled amplifier.
4. Design of RC phase shift oscillator using BJT
5. Design of colpitts oscillator using BJT
6. Design of hartley oscillator using BJT
7. Design of Astablemultivibrator
8. Design of monostablemultivibrator using BJT
9. Design of bistablemultivibrator using BJT
10. Study of Wein Bridge Oscillator using BJT
11 Study of 78XX and & 79XX

Note for Paper Setter: Question paper contains 50% theory and 50% numerical & Design.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

LINEAR INTEGRATED CIRCUITS

Course Details:

Class	SY B. Tech. Sem-IV
Course Code & Course Title	PCC-EN-402
Prerequisites	Basic Electronics, Knowledge of Components
Teaching scheme: Lecture/Practical	**4/2**
Credits	**5**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures 4Hrs /week	Theory : 100 Marks
Tutorial - /week	70 (ESE) + 30(CIE)
	TW: 25Marks
Practical :2 HRS /week	POE: 50Marks

CourseObjectives:

The course aims to:

1. Understand the internal circuit of operational amplifier and its electrical parameters.
2. Indicate the importance of an op-amp in building an analog computer.
3. Design the various applications of op-amp.
4. Develop practical skills for designing and testing of circuits using analog ICs.

Course Outcomes:

CourseOutcomes:

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

1. Understand the basic principles of operational amplifier
2. Select appropriate opamp for a particular application by referring datasheets
3. Design opamp based circuits to give specified gain
4. Design signal conditioning circuits in an instrumentation system

Course Contents

1 Differential Amplifiers **06**

Differential Amplifier-Configuration, DC & AC Analysis of Dual Input Balanced Output Configuration. Comparative study of other configuration of Differential amplifiers, Constant Current Bias, CurrentMirror, DC coupling & Cascade differential stages, Level Translator & its need

2	**OP-Amp Characteristics** Block Diagram of Op-Amp, Ideal & Practical Op-amp specifications, Transfer characteristics of Opamp, Op-amp parameters & measurement: Input &outputoffset voltages, Input & output offset currents, Input Bias current, slew rate, CMRR, PSRR, Thermal drift. Comparative study of Data Sheets – μA 741, OP 07, LM 324, LM 311, LM 308, LM380, CA 3140.	**08**
3	**Op-Amp Configurations & Frequency Response**. Open Loop & Closed Loop- Inverting, Non-Inverting and Differential (Using one op-amp). Analysis for Av, Ri, Ro, Bandwidth, and Total output offset voltage. AC & DC amplifiers – Allconfigurations.(Numericals are expected).Open loop frequency response, Closed loop frequency response, circuit stability,slew rate.	**07**
4	**Linear & Non-Linear Applications** Summing amplifier (Inverting & Non-Inverting), Subtractor, Integrator, Differentiator, Instrumentation Amplifier (3 op-amps), Instrument ation amplifier using transducer bridge, Single Chip Instrumentation Amplifier(INA Series), I-V & V-I converter. (Numericals are expected). Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and antilog amplifier, precision rectifier, sample and hold circuits	**09**
5	**Active Filters and Oscillators** First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject, & All Pass Filters,RC phase Shift oscillator, Weins Bridge Oscillator, &Quadrature oscillator. Square wave generator (AstableandMonostableMulti-vibrator)Triangular Wave generator, V-F, F-V converter using Op-amp	**06**
6	**Monolithic IC Applications** IC 555 (Timer): Block Diagram, Multi-vibrators and Applications. PLL- Introduction, Block Diagram, Operating Principles & description of individual blocks, IC 566VCO ,IC 565 PLL & Applications. IC 8038 Waveform generator	**04**

Text Books:

1 Ramakant. A. Gayakwad, "Op-Amps & Linear Integrated Circuits", 3rd Edition, PHI

2 S.Salivahanan&Bhaaskaran, "Linear Integrated Circuits", 1st Edition, Tata McGraw

Reference Books:

1. National Analog& Interface products Data book—National Semiconductors
2. T.R Ganesh Babu, "Linear Integrated Circuits", 3rd Edition, SciTech Publication
3. Sergio Franco, "Design with op-amp &Analog Integrated Circuits", 3rd Edition, Tata McGraw Hill
4. David. A. John & Ken Martin, "Analog Integrated Circuit Design", Student Edition, Wiley.

List of Experiments (Minimum 10):

1. Study of Data sheets of following IC's (Compulsory)
   μA 741, OP 07, LM324, LM 308, LM380, CA 3140, LM 311.
2. Measurement of op-amp parameters Using IC 741 a) Input offset voltage b) Input offset current c) slew rate d) CMRR.
3. Study of Inverting amplifier for DC & AC inputs using IC 741
4. Study of Non-Inverting amplifier for DC & AC inputs using IC 741
5. Frequency Response of Inverting & Non-Inverting amplifier using IC 741
6. Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308
7. Study of Instrumentation Amplifier using LM 324
8. Study of V-I & I-V Converter using IC 741
9. Study of Schmitt Trigger using IC 741 &Windowdetector using LM 311
10. Study of Comparator & ZCD using LM324/OP 07
11. Study of Precision Rectifier using IC 741
12. Study of Butterworth Filter (Any Two) using IC 741
13. Study of Triangular & square wave generator using IC 741
14. Study of IC 555 Timer as Astable&MonostableMultivibrator (NE/SE 555)
15. Study of Weins Bridge Oscillator using IC 741

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

CONTROL SYSTEM ENGINEERING

Course Details:

Class	S.Y.B. Tech. Sem-IV
Course Code & Course Title	PCC-EN-403
Prerequisites	1. A basic knowledge of Engineering Mathematics. 2. Knowledge of complex variables and Laplace Transform 3. Aawareness about the MATLAB/Lab View/Scilab software.
Teaching scheme: Lecture+Tutorial	**3 +1**
Credits	**4**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures: 3 HRS /week	Theory : 100 Marks
Tutorial: 1HR /week	70 (ESE) + 30(CIE)
	TW: 25Marks
Practical : -/week	POE: -Marks

CourseObjectives:
The course aims to:

1. To study the fundamental concepts of Control systems and mathematical modeling of the system.
2. To study the concept of time response and frequency response of the system.
3. To study the basics of stability analysis of the system.

Course Outcomes:

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

1. Derive the mathematical model of different type of the systems.
2. Understand the basic concepts of control system.
3. Understand the analysis of systems in time and frequency domain.
4. Apply the control theory to design the conventional PID controller widely used in the industries.

Course Contents

1: Introduction to Feedback Control System	Classification of control System, Mathematical models of physical system- Electrical & Mechanical System , Transfer function of electrical systems, Block diagrams and reduction techniques including signal flow graphs using Mason's gain formula.	(7 Hrs.)
2: Feedback Characteristics of Control system	Feedback & Non-feedback systems, Reduction of parameter variations by use of feedback, control over system dynamics by use of feedback, control of effect of disturbance signals by use of feedback, The concept of stability, Routh Hurwitz stability criteria.	(4 Hrs.)
3 : Time Domain Analysis	Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system.	(7 Hrs.)
4: Frequency Domain Analysis	Introduction, correlation between time & frequency domain, Bode plots, gain margin, phase margin, effect of addition of poles & zeros on bode plots, Polar plots, Nyquist stability.stability using Bode plot.	(7 Hrs.)
5: State Space Analysis	Concept of state, state variables & state model State-space representation, computation of the state transition matrix, transfer function from the state model, controllability of linear system, observability of linear system.	(4 Hrs.)
6: Compensators & controllers	a. Compensators- Need of compensation, lead compensation, lag compensation, Lead-lag compensation. b. Controllers- ON-OFF controller, Proportional, Integral, derivative &PID controllers, principle and operations. PLC controllers- Block schematic, PLC addressing, Liquid level control using ladder diagram.	(7 Hrs.)

Text Books:

1 A. Ananadkumar, "Control system Engineering" PHI publication 2nd edition.

2 R. Anandanatarajan, P. Ramesh Babu , "Control Systems Engineering", Scitech Publications .

3 John R. Hackworth,Fredrick D. Hackworth " Programmable Logic Controller" Pearson publication.

4 I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International

Reference Books:

1 Norman S. Nise "Control Systems Engineering", 8th edition, Wiley edition.

2 SamarjeetGhosh, "Control Systems Theory & Applications", 1st edition, Pearsoneducation

3 S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearsoneducation.

4 S. N. Shivanandan,S. N. Deepa," Control System Engineering" Vikas Publications 2nd edition

5 Dhanesh N. Manik " Control Systems" Cengage learning

Guidelines for Paper Setter:
Theory Question Paper should include 40% Numerical Problems.

SHIVAJI UNIVERSITY, KOLHAPUR
ELECTRONICS ENGINEERING DEPARTMENT

DIGITAL COMMUNICATION

Course Details:

Class	Second Year. B. Tech. Sem-IV
Course Code & Course Title	PCC-EN404
Prerequisites	• **Basics of Signals & Systems.** • **Basic concepts of communication**
Teaching scheme: Lecture/Practical	**3/2**
Credits	**4**
Evaluation Scheme CIE/ESE for Theory	**30/70**

Teaching Scheme	**Examination Scheme**
Lectures 3 HRS /week	Theory : 100 Marks
Tutorial - /week	70 (ESE) + 30(CIE)
	TW: 25 Marks
Practical :2 HRS /week	POE: - Marks

CourseObjectives:
The course aims to:

1 Understand basic component of digital communication systems and study of probability theory.
2 Study of source coding techniques and various data formats.
3 Students will make acquainted with digital modulation technique and spread spectrum techniques.
4 To realize need of synchronization and their methods.
5 Understand the concept of baseband transmission and optimum detection.

Course Outcomes:

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

1 Understand probability and random process.
2 Understand and analyze the design issues of digital communication systems.
3 Capable to describe different source coding techniques and data formats.
4 Identify digital modulation schemes and computer performance of these techniques.
5 Understand the concept of spread spectrum techniques.
6 Explain the concept of optimum receiver and equalizer.

Course Contents

Unit 1 Probability Theory, Random Variable & Process: **7 Hrs.**

Probability, properties of probability joint & conditional probability.
Random variables, CDF, PDF Probablity mass function Probablity density function Joint CDF & PDF, Statistical Averages, Uniform Distribution Rayleigh Distribution. Random Processes, Time averaging &Ergodicity, Auto correlation.

Unit 2 Source Coding: **8 Hrs.**

Quantization – Uniform & Non-Uniform, companding PCM Differential pulse code modulation (DPCM) Delta modulation (DM), noise in Delta Modulation. Adaptive Delta Modulation, CVSD. Performance of all coding scheme based on. Effect of noise, SNR, Bandwidth.

Unit 3 Digital Signaling Formats: **3 Hrs.**

Introduction, NRZ codes,RZ, Phase encoding, M-array formats. Synchronization: Bit and symbol synchronization, frame synchronization. Carrier recovery circuits, Scrambler &Unscrambler.

Unit 4 Band pass Modulation & Demodulation: **8 Hrs.**

Generation, detection,signal space diagram,spectrum, bandwidth, efficiency &probablity of error analysis of:Amplitude shift keying (ASK), phase shift keying (PSK), Frequency shift keying (FSK),Binary phase shift keying (BPSK). Quadrature phase shift keying (QPSK), Differential phase shift keying (DPSK) Differential encoded phase shift keying (DEPSK), Quadrature amplitude modulation(QAM).

Unit 5 Baseband Transmission & Optimum Detection: **7 Hrs.**

Baseband transmission of binary data, ISI & Its minimization, NYQUIST pulse shaping criteria, Pulse shaping by digital methods,Eye pattern, M-array signaling. Optimum receiver, matched filters & its properties. Correlation receiver,adaptive equalization & schemes

Unit 6 Spread Spectrum Modulation: **3 Hrs.**

Introduction, Direct sequence spread spectrum Use of spread spectrum with CDMA. Ranging using DS spread spectrum. Frequency hopping Spread Spectrum, generation & characteristics of PN Sequences

Text Books:

1 Simon Haykin, " Digital Communication", John Wiley & Sons, IVthEdition.

2 Bernard Sklar,"Digital Communication-Fundamentals & Applications", 2nd Edition, Pearson Education.

Reference Books:

1 B.P.Lathi&Zhi Ding, "Modern Digital & Analog Communication Systems", 4th Edition, Oxford University press.
2 R.P.Singh&S.D.Sapre, "Communication System Analog & Digital", McGraw-Hill, 2nd Edition, 2001.
3 John Prokis, "Digital Communication", 4th Edition, McGraw Hill

List of Experiments (Minimum 10):

1. Study of Pulse Code Modulation
2. Study of Delta Modulation
3. Study of Adaptive Delta Modulation
4. Study of Data Formats
5. Study of Amplitude Shift Keying
6. Study of Frequency Shift Keying
7. Study of Phase Shift Keying
8. Study of Quadrature Phase Shift Keying
9. Study of any Modulation Technique using MATLAB/SCILAB
10. Study of CDF & PDF for Random signals using MATLAB/SCILAB
11. Study of Standard Random Variables Density Distribution Function

Guidelines for Paper Setter:

Theory Question Paper should include 20% Numerical and 80% Theory.

SHIVAJI UNIVERSITY, KOLHAPUR

ELECTRONICS ENGINEERING DEPARTMENT

5. Data Structures

Course Details:

Class	S.Y. B. Tech. Sem-IV
Course Code & Course Title	PCC-EN-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.

Course Outcomes:

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:** Introduction to theory of data structures, data types, Classification of data structure, Algorithms: complexity, time space trade-off with example.	**(02 Hrs)**
UnitNo: 2	**Arrays, Records & Pointers:** 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.	**(06 Hrs)**
UnitNo: 3	**Linked Lists:** 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.	**(06 Hrs)**
UnitNo: 4	**Stacks & Queues:** 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.	**(07 Hrs)**
UnitNo: 5	**Trees :** 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.	**(07 Hrs)**
UnitNo: 6	**Graphs &Hashing**: 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	**(08 Hrs**

Note: Minimum 10 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 ENGINEERING DEPARTMENT
PROGRAMMING LAB-II

Course Details:

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

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

CourseObjectives:

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++ templates and 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** **04**

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**.**

UNIT : 2 **Overloading** **04**

Function overloading, assignment operator overloading, binary operator overloading, unary operator overloading.

UNIT : 3	**Constructors And Destructors** Constructors- copy constructor, default constructors, destructors, inline member function, friend function, dynamic memory allocation.	**03**
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 Inheritance.	**04**
UNIT : 6	**Template And Exception Handling** Function template, class template, exception handling.	**03**

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.