Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur
(Approved by AICTE, New Delhi, Recognized by Government of Maharashtra & Affiliated to BATU University, Lonere)
NBA Accredited Programs, Accredited By NAAC 'A' Grade,
ISO 9001:2015 Certified

Teaching and Evaluation Scheme for S Y B. Tech.

Department of Electronics and Telecommunication Engineering

Semester: III &IV

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Department: Department of Electronics & Telecommunication Engineering

Rev: Course Structure/00/2021-22

Class: S.Y. B.Tech. **Semester:**III

Course Code	Type of Course	Course	Teaching Scheme					Evaluation Scheme				
			L	T	P	Credits	Total Hrs	CA1	CA2	MSE	ESE	Total
ETC301	BSC5	Engineering Mathematics-III	3	1	0	4	4	10	10	30	50	100
ETC302	PCC1	Electronic Devices and circuits	3	-	-	3	3	10	10	30	50	100
ETC303	PCC2	Digital Logic Design	3	-	0	3	3	10	10	30	50	100
ETC304	PCC3	Network Analysis	3	1	-	4	4	10	10	30	50	100
ETC305	ESC9	Transducers And Measurements	3	-	-	3	3	10	10	30	50	100
ETC302L	PCC1L	Electronic Devices and Circuits Lab	--	--	2	1	2	15	15	--	20	50
ETC303L	PCC2L	Digital Logic Design Lab	-	-	2	1	2	15	15	--	20	50
ETC305L	ESC9sL	Transducers And Measurements Lab	-	-	2	1	2	15	15	--	20	50
ETC306	MC1	Environmental science	2	-	-	Audit	2	25	25	--	-	50
ETC307	HSMC2	Aptitude Skill I	1	-	-	Audit	1	25	25	--	-	50
ETC308	HSMC3	Language Skill I	-	-	2	Audit	2	25	25		-	50
ETC309	MNPROJ2A	Mini Project Phase-I	-	-	2	Audit	2	25	25		-	50
ETC310	INT/FT	Internship/ Field Training	-	-	-	Audit	-	-	-	-		50
			18	**2**	**10**	20	**30**	**195**	**195**	**150**	**310**	**900**

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ
Credits	-	4	4	12	--	--	--
Cumulative Sum	4	20	23	12	-	-	-

Semester III

1.Engineering Mathematics-III

ETC301	BSC5	Engineering Mathematics-III	3-1-0	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	CA1:10Marks CA2:10Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Engineering Mathematics-I & II

Course Objectives:

1	To introduce the concept of Laplace transform.
2	To introduce the concept of Inverse Laplace transform to find the solution of linear differential equation with constant coefficients.
3	Able to form and solve the partial differential equation using different analytical techniques and to solve different forms of heat equations.
4	Able to expand the given periodic function defined in the given range in terms of sine and cosine multiple of terms as a Fourier series.
5	To discuss the importance of Fourier transform in Engineering.
6	To explain Z- transform.

Course Outcomes: At the end of the course, students will be able to:

1	Apply the definition & properties of Laplace Transform to evaluate the integral & to find Laplace transform of elementary functions and special functions like periodic function, Dirac-delta function & unit step function.
2	Apply the knowledge of Laplace transformation to find solution of linear differentiation equations with constant coefficient.
3	Solve partial differential equations & use of separation of variable method to solve heat and Laplace equations.
4	Develop the concept of Fourier series expansion of different periodic functions so as to use them in harmonic analysis.
5	Solve problems related to Fourier transform and inverse Fourier transform.
6	Solve finite difference equation using Z- transform.

Course Contents:

Unit 1: Laplace Transform [8]

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by t^n, scale change property, transforms of functions divided by t, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

Unit 2: Inverse Laplace Transform [7]

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

Unit 3: Partial Differential Equations and Their Applications [8]

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of separation of variables – applications to find solutions of one dimensional heat flow equation ($\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$), and two dimensional heat flow equation (i.e. Laplace equation ; $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$).

Unit 4: Fourier series [7]

Definition, Euler's formulae, Conditions for a Fourier expansion, Functionshaving points of discontinuity, change of interval, expansions of odd andeven periodic functions and half range series.

Unit 5: Fourier Transforms [6]

Fourier Transforms, Fourier Sine and Cosine Transforms, Complex form ofFourier Integral, Finite Fourier Sine and Cosine Transform.

Unit 6: Z Transform [6]

Definition, properties of z transform, Z Transform of basic sequences, Z transform of some standard discrete function inverse Z transform.

Text books:

1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune.

2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.

Reference books:

1. C. R. Wylie & L. C. Barrett, Advanced Engineering Mathematics, McGraw Hill Publishing Company Ltd.

2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publications, New Delhi.

3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

4. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

2.Electronic Devices and Circuits

ETC302	PCC1	**Electronic Devices and Circuits**	3-0-0	3Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA1:10Marks CA2:10Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic Electronics

1	Explain working of JFET & MOSFET with applications.
2	Explain different types of amplifiers.
3	Illustrate the oscillator circuits.
4	Design an adjustable voltage regulator & multivibrator circuits

Course Outcomes: At the end of the course, students will be able to:

1	Explain working of JFET & MOSFET with applications.
2	Explain different types of amplifiers.
3	Illustrate the oscillator circuits.
4	Design an adjustable voltage regulator & multivibrator circuits

Course Contents:

Analog Circuits-I

1. Regulated Power Supplies:

Need of voltage regulator and Classification. Discrete Regulators-Analysis and Design of Zener Shunt Regulator, Transistor Shunt Regulator, Emitter Follower Regulator, Series Pass Regulator(with Pre- regulator & Overload protection circuit). Study and design of regulators using IC's:78XX, 79XX, 723, LM317, Switching regulator: Introduction, study of LM3524.

2. BJT Overview: Physical structure, Transistor currentsJFET

Introduction to JFET, Types, Construction, Operation, Static Characteristics, Pinch off voltage, FET Volt-Ampere characteristics, FET Configurations (CS/CD/CG) and their Comparison. Biasing of FET (Self).FET as an amplifier and its analysis (CS) and its frequency response, Small signal model, FET as High Impedance circuits

3. MOSFET& its DC Analysis Basics of MOS Transistor operation, Construction of n-channel E-MOSFET, E-MOSFET characteristics & parameters, non-ideal voltage current characteristics viz. Finite output resistance, body effect, sub-threshold conduction, breakdown effects and temperature effects. Common source circuit, Load Line & Modes of operation, common MOSFET configurations: DC Analysis
4. Electronics Amplifiers

Classification of amplifiers, Fundamentals of Low noise and Power amplifiers. Feedback amplifiers: Feedback concept and topologies, Effect of feedback on terminal characteristics of amplifiers, feedback amplifier analysis, cascade amplifiers, DC Amplifiers.

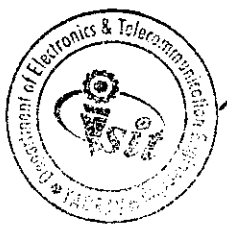
5. Oscillators

Barkhausen criterion, stability with feedback. Classification of oscillators, RC Oscillators: FET RC Phase Shift oscillator, Wein bridge oscillator, LC Oscillators: Hartley and Colpitts oscillators, Crystal oscillators, UJT Relaxation oscillator.

6. Multivibrators
   IC555 Block diagram, Types of Multivibrators: Astable, Monostable and Bistable, Operation of Multivibrators using FETs and IC555. Applications of IC555 in Engineering.

TEXT/REFERENCE BOOKS for Analog Circuits

1. Millman Halkias, "Integrated Electronics-Analog and Digital Circuits and Systems", Tata McGraw Hill, 2000.
2. Donald Neaman, "Electronic Circuit Analysis and Design", 3rd Edition, Tata McGraw Hill.
3. David A. Bell, "ElectronicDevicesandCircuits",5thEdition, Oxford press
4. R. L. Boylstad, L. Nashlesky, "Electronic Devices and circuits Theory", 9thEdition, Prentice Hall of India, 2006.
5. Anil K. Maini and Varsha Agarwal "Electronic Devices and Circuits", Wiley India
6. Phillip E. Allen, Douglas R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford.
   K. R. Botkar, "Integrated Circuits", 5th Edition, Khanna Publication



3.Digital Logic Design

ETC33	PCC2	Digital Logic Design	3-0-2	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3hrs./week	Mid Semester Exam: 30 Marks
Practical: 2 hr/week	End Semester Exam: 50 Marks

Pre-Requisites: Basic Electronics

Course Objectives:

1	Explain Boolean Algebra & various methods of reduction techniques
2	Understand principles, characteristics and operations of combinational logic
3	To design, implement and Sequential circuits.
4	To design & implement Finite State Machine combinational
5	Design combinational circuits by using logic gates, MSI circuits, PLDs.
6	To Explain the need of Hardware Description Lang. (HDL) to design & implement digital

Course Outcomes: At the end of the course, students will be able to:

CO1	Apply Boolean laws/k map method to reduce given Boolean function.
CO2	Design combinational logic circuits.
CO3	Illustrate and implement sequential logic circuits for shift registers, counters
CO4	Apply FSM models to design to building blocks likes sequence detector.
CO5	Interpret about semiconductor memories & PLD's.
CO6	Explain basic of VHDL & make use of Simulation tool (ISE).

Course Contents:

Unit I: Fundamentals of Digital Electronics **[6]**

Arithmetic of Number Systems Binary, Octal Hex & BCD, Introduction of Boolean algebra, Concept of Min terms-Max terms, SOP-POS forms, Reduction Techniques, K- Map, K-map with Don't Care Condition, and Introduction to Codes.

Unit II: Design of Combinational Circuits **[6]**

Design Combinational Logic : Adder, look ahead carry generator, Sub Tractor, Sub tractor using 1's complement & 2's Complement, BCD Adder, Magnitude Comparator, Parity generators/checkers, Code converters, Design of Multiplexers and Demultiplexers, Encoders, Decoders, BCD - to - 7 segment decoder.

Unit III: Introduction of Digital Logic Family **[6]**

Digital CMOS Logic Family:

Classification of Logic Families ,Characteristics of TTL & CMOS Logic families & their comparison of TTL & CMOS logic families,

CMOS Logic: CMOS inverter, static & dynamic characteristics, NAND & NOR gates.

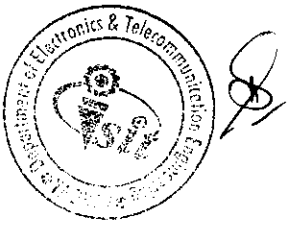
Study of Semiconductor Memories: RAM, ROM, EPROM, PAL & PLA

Unit IV: Sequential Machines Fundamentals **[6]**

1-bit memory cell, latches and Flip-Flops (S-R, D, J-K &T), Use of preset and clear inputs, Excitation table for Flip-Flops, Conversion of Flip-Flops Applications of Flip-Flops: Shift Registers, Counters- Ripple counters, Synchronous Counters, Ring Counters, and Johnson Counter.

Unit V: Synchronous Sequence Machines **[6]**

FSM, Moore/Mealy machines, state diagram, state table, state assignment, state reduction, sequence detector



Unit VI : Introduction to VHDL **[6]**

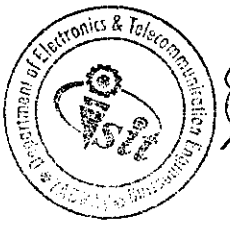
Levels of abstraction, Digital system design flow, HDL's, Type of modeling - Structural and behavioral and data flow, difference between VHDL & Verilog.

Text Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Fundamentals of Digital Circuits	A. Anand Kumar	PHI	3rd	2008
2	Digital Design	M. Morris Mano	PHI	3rd	2008
3	Principles of DSE using VHDL	Roth John	Cengage	2nd	2008
4	Modern Digital Electronics	R.P. Jain	Tata McGraw Hill	3rd	2011
5	Fundamentals of Digital Logic with VHDL Design	Stephan Brown , Zvonko Vranesic	TMH	2nd	2009

Reference Books:

Sr. No	Title	Author	Publisher	Edition	Year of Edition
1	Digital Design Principles	Wakerly	Pearson	4th	2006
2	Digital Design	Leach,Malvino	TMH	4th	2011
3	Digital Integrated Circuits-A Design Perspective	Jan Rabey, Anantha C	PHI	2nd	2009
4	VLSI Design	Debaprasad Das	Oxford University Press	2nd	2016



4. Network Analysis

ETC304	PCC3	Network Analysis	3-1-0	4Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	CA1-10Marks CA2-10Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Physics

Course Objectives:

1	Explain basic concepts related to network theory.
2	Analyze Networks with the help of different network theorems.
3	Determine response of R, L, C, circuit.
4	Calculate two port network parameters.
5	Design active and Passive Filter

Course Outcomes: At the end of the course, students will be able to:

1	Apply Knowledge of Mathematics to solve numerical based Network simplification.
2	Explain the Network Theorems & Solve the Numerical Problems.
3	Discuss the different two port Network and solve the numerical analysis
4	Explain the Series and parallel resonance w.r.t different parameters.
5	Analyze the Transient Analysis in Networks
6	Design Passive Filter & Its Design.

Course Contents:

Course Contents:

Unit 1: Basic Concepts **[6]**

Basic Electrical Elements, Classification of Network Elements,Energy and Power in Network elements,Mesh and Node Analysis: Loop and Node Analysis with Dependent and independent sources, Super Mesh and Super Node Analysis

Unit 2:Network Theorems **[6]**

Principle of Dual Networks, Analysis of Networks using Superposition theorem, Tellegen's Theorem, Reciprocity Theorem, Thevenin's Theorem, Norton's, Theorem, Millman's Theorem, Maximum Power Transfer

Unit 3 : Two port network **[6]**

Two port networks (z, y,) Two port networks parameters T, H,interrelationship between parameters,cascade connection of two port networks

Unit 4: Resonance **[8]**

Defination , 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 – Anti resonance frequency, variation of impedance & admittance with frequency, . Selectivity & B.W.

Unit 5: Transient Analysis in Networks **[8]**

Behavior of R, L & C components under switching conditions in time domain, initial & final value theorem, step and ramp response of RLC circuit, solution of a network using Laplace transform

Unit No 6 : Filters **[8]**

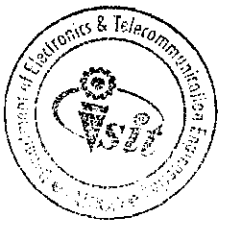
Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant (O) , phase shift (N) propagation constant (S) characteristic impedance (Zo) , decibel ,neper. Design & analysis of constant K, M derived & composite filters (low pass, high pass, band pass & band stop filters): T & Pi sections.

Text Books:

1. A. Sudhakar ,Shyammohan S.Palli 'Circuit & Network – Analysis & Synthesis' IIIrd Edition – Tata McGraw Hill Publication (Unit II,IV,V)
2. A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)' - IIIrd Edition (Unit I,II) Dhanpat Rai & co
3. D. Roy Choudhury 'Networks & Systems' - New Age International Publisher (Unit I,II,III)
4. Soni Gupta 'Electrical Circuit Analysis' Dhanpat Rai & Co. (Unit III,IV,V,VI)

Reference Books:

1. William H Hayt, Jack E Kimmerly and Steven M.Durbin, Engineering Circuit Analysis, Tata McGraw Hill
2. M.E.Van Valkenburg ' Network Analysis' – IIIrd Edition , Pearson Education / PHI
3. Josheph Edministrar 'Theory & Problems of Electronic Circuit (Schaum's series) – Tata McGraw Hill, Publication
4. R.G .Kaduskar, S.O.Rajankar, T.S. Khatavkar, Network Fundamentals and Analysis – Wiley India



5. Transducers and Measurements

ETC305	ESC9	Transducer& Measurements	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture:3 hrs/week	CA1:10Marks CA2:10Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites:

Course Objectives:

1	Provide introduction to different types of Transducers & sensors with their
2	Provide knowledge of different parts of Measurement system such as Signal
3	Design of Instrumentation system to meet desired specifications
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: At the end of the course, students will be able to:

1	Select appropriate transducer as per requirement of application
2	Classify different data acquisition system
3	Interpret about various instrumentation systems
4	Choose proper instrument to measure different electrical parameters
5	Explain functions of display devices
6	Analyze different Bridges

Course Contents:

Unit I Transducers & Sensors: **[06]**

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, Proximity Devices, optical Sensors, Smart Sensors, Piezo – electric sensors

Unit II Signal Conditioning & Data Acquisition System: **[06]**

Introduction, AC & DC Signal Conditioning, Chopper Stabilized Amplifier, Instrumentation Amplifier, Isolation And Programmable Gain Amplifier, Grounding And Shielding, Concept of Active Filters, Practical Comparators, Modulators, Demodulators, Sine And Other Waveform Generation, Principles and working of different types of ADC and DAC

Unit III Instrumentation Techniques: **[06]**

Introduction to Process Instrumentation, Instrumentation set up for measurement of non electrical quantity such as weight using strain gauge

Unit IV Introduction to Measurement: **[06]**

Introduction, Performance Characteristics, Static Characteristics, Error in 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

Unit V Measurement & Display Devices: **[06]**

CRO: Dual Beam, Dual Trace, 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

Unit VI Bridges: **[06]**

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

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. Instrumentation 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

6.Electronic Devices and Circuits Lab

ETC302L	PCC1L	**Electronic Devices and Circuits Lab**	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs./week	CA1-15Marks CA2-15Marks ESE-20Marks

Course Outcomes: At the end of the course, students will be able to:

1	Demonstrate common source amplifier circuit & test the performance.
2	Illustrate LC oscillator & MOSFET as inverter.
3	Design voltage regulator & multivibrator circuits.

Experiment List

1. Design a single stage FET Amplifier in CS configuration and verify DC operating point
2. Build and test single stage CS amplifier using FET.
3. Design a single stage FET Amplifier in CS configuration and verify DC operating point
4. Simulate Voltage series feedback amplifier
5. Implement LC oscillator using FET
6. Simulate MOSFET/ CMOS Inverter.
7. Design and implement an adjustable voltage regulator using three terminal voltage regulators.
8. To design and study the monostable multivibrator circuit using 555 timer.
9. To design and study the astable multivibrator circuit using 555 timer.

7. Digital Logic Design Lab

ETC303L	PCC2L	Digital Logic Design Lab	0-0-2	01 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hr/week	CA1-15 Marks CA2-15 Marks ESE-20 Marks

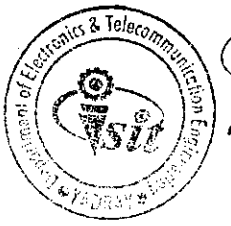
Course Outcome

1	Demonstrate Logic functions using Universal gates & various combinational circuits.
2	Design & verify Sequential Logic Circuits.
3	Design & Verify Universal gates & combinational circuits make use of Simulation toll.(ISE)

Experiment List

Sr.No	Name of Experiment
1.	Study and Verify the truth table of the Basic Logic Gates.(7400,7402,7404,7408,7432,7486,74266)
2.	Study and Verify of NAND and NOR as a Universal Gates (7400,7402)
3.	Study and Verify the Demorgan's Theorem
4.	Study and Verify of Half Adder and Full Adder
5.	Study and Verify of Half Subs tractor and Full Substractor
6.	To Design and Implement 4-Bit Binary to Gray and Gray to Binary
7.	Study and Verify of 7485 magnitude comparator
8.	Study and Verify of MUX /DEMUX using 74151 and 74138
9.	Study and Verify of Flip Flop JK ,D and T.
10.	Study and Verify of asynchronous counter 7473
11.	Study and Verify of Synchronous counter
12.	Study and Verify of the BCD Counter 7490
13.	Study and Verify of Shift Register
14.	Write, Simulate & Verify VHDL Code for Verify the truth table of the Basic Logic Gates.
15.	Write, Simulate & Verify VHDL Code for Half Adder and Full Adder

- **Minimum 10 experiments from above list with 14th and 15th experiment is compulsory.**



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8. Transducers and Measurement Lab

ETC305L	ESC9L	Transducer& Measurements Lab	0-0-2	1 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs./week	CA1-15Marks CA2-15 Marks ESE-20 Marks

Course Outcomes: At the end of the course, students will be able to:

1	Illustrate different types of instruments
2	Explain functions of display devices
3	Analyze Ac & DC Bridges

Experiment list:

Student can perform any 8 experiments out of 10 experiments

Sr. No.	Title of Experiment
0	Study of weight measurement using Strain Gauge
1	Study displacement measurement using LVDT
2	Study of temperature measurement using RTD PT 100/Thermister/Thermocouple
3	Study of position measurement using Synchro transmitter –receiver
4	Study of Cathode Ray oscilloscope & Measurement of amplitude & frequency using CRO
5	Measurement of phase & frequency by lissajous pattern using CRO
6	Study of function Generator
7	Study of Spectrum Analyzer
8	Study of AC Bridge
9	Study of DC Bridge

9. Environment Science and Engineering

ETC306	MC1	Environment Science and Engineering	2-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	CA1-25 Marks CA2-25 Marks

Pre-Requisites: NA

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain various natural resources and associated Problems
CO2	Summarize various ecosystems
CO3	Explain the importance of conservation of biodiversity and its importance in balancing the earth.
CO4	Recognize various causes of environmental pollution along with various protection acts in India to limit the pollution
CO5	Extract the information based of field study and prepare a report.

Course Contents:

Unit 1: Nature of Environmental Studies **[2]**

Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness.

Unit 2: Natural Resources and Associated Problems **[6]**

Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.

Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.

Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.

Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.

Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of individuals in conservation of natural resources.

Unit 3: Ecosystems **[4]**

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers.Energy flow in the ecosystem, Ecological succession.Food chain etc. in concern with forest ecosystem, Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession.Food chain etc. in concern with Grassland ecosystem Producers, consumers and decomposers.Energy flow in the ecosystem.Ecological succession. Food chain etc. in concern with Desert ecosystem Producers, consumers and decomposers. Energy flow in the ecosystem.Ecological succession. Food chain etc. in concern with various aquatic ecosystems

Unit 4: Biodiversity **[4]**

Introduction- Definition: genetic, species and ecosystem diversity, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, various approaches for the conservation of biodiversity. And at least one case study in line with this

Unit 5: Environmental Pollution and Environmental Protection **[4]**

Definition: Causes, effects and control measures of various types of pollution. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Concept of sustainable development : From Unsustainable to Sustainable development Various environmental Protection Acts and their scope

Unit 6: Field Work **[4]**

The student should Visit to a local area to document environmental assets-River/Forest/Grassland/Hill/Mountain.

Or

Visit to a local polluted site - Urban / Rural / Industrial /Agricultural.

Or

Study of common plants, insects, birds. or Study of simple ecosystems - ponds, river, hill slopes, etc.

The student should expect to do this activity in a group size of 4-5 and prepare and submit a report on it.

Text Books:

1. Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)
3. Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
4. Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Wastern Ltd.
7. Down to Earth , Centre for Science and Environment , New Delhi.(R)
8. Gleick, H.,1993, Water in crisis, Pacific Institute for studies in Dev., Environment & Security. Stockholm Env.Institute. Oxford Univ. Press 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H.& Watson, R.T.1995, Global Biodiversity Assessment, Cmbridge Univ. Press 1140p.
11. Jadhav, H.and Bhosale, V.M.1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.
12. Mickinney, M.L.and School. R.M.1196, Environmental Science Systems and Solutions, Web enhanced edition, 639p.
13. Miller T.G. Jr., Environmental Science. Wadsworth Publications Co.(TB).
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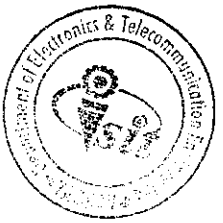
15. Rao M.N.and Datta, A.K.1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p
16. Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut
17. Survey of the Environment, The Hindu (M)
18. Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
19. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media (R)
20. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB)



10. Aptitude Skill-I

Aptitude Skill-I

Teaching Scheme:	Examination Sch HSMC | | Aptitude S eme:
Lecture: 1hrs/week Tutorial: NA Practical: NA	Mid Semester Exam: 30 End Semester Exam:50 Term Work: NA Oral Exam: NA Practical and Oral Exam:NA

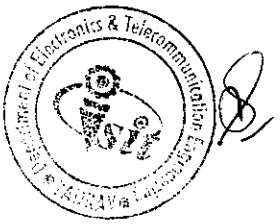
Pre-Requisites: Communication Skills

[redacted]

Aptitude (12Hrs) (Compulsory)

Course Objectives:

1	To study multiplications, squares, square roots, cubes and cube roots to solve aptitudeproblems
2	To understand the concepts of Number system
3	To study the basics of aptitude skills like percentage, average, ratio and proportion,
4	To study the various speed, time and distance basic concepts
5	To understand the concepts of business aptitude
6	To understand the Concepts of Geometry and Venn diagram in Aptitude



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Course Outcomes: At the end of the course, students will be able to:

1	Understand speed math techniques to solve aptitude problems
2	Summarize number systems in detail.
3	Explain basic aptitude techniques related to Percentage, Average, Ratio Proportion and Fraction
4	Understand speed,time and distance concepts
5	Summarize the concepts of Business aptitude using basic aptitude
6	Solve the aptitude problems on Geometry and Venn Diagram

Course Contents:

Unit 1: Speed Math Techniques **[1]**

Multiplication, Squares,Square roots, Cubes, Cube roots

Unit 2: Number System **[2]**

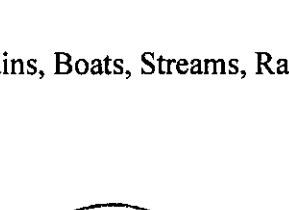
Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions

Unit 3: Basic Aptitude **[3]**

Percentage, Average, Ratio and Proportion, Fraction, Partnership

Unit 4: Speed- Time- Distance **[2]**

Speed, Time, and Distance, Trains, Boats, Streams, Races



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Unit 5: Business Aptitude [2]

Profit & Loss, Simple Interest, Compound Interest

Unit 6: Geometry and Venn Diagram [2]

2D and 3D Mensuration, Venn diagram

Text Books:

1. ArunShrama - Quantitative aptitude for CAT.
2. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning,S.Chand Publisher; 2016 edition
3. RS Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand Publisher; 2016 edition

Reference Books:

1. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
2. Teach Yourself Quantitative Aptitude, Arun Sharma
3. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khattar

Verbal Ability (12Hrs) (Compulsory)

Pre-Requisites: Communication Skills

Course Objectives:

1	To study basics of sentences and its structure
2	To study the tenses and its use in daily life
3	To study the basics of speeches and voices
4	To study the basic concepts of modal verbs
5	To study the different Phrases, Idioms and Proverbs
6	To build the vocabulary for day to day life

Course Outcomes: At the end of the course, students will be able to:

1	Understand basic concepts of sentences and its structure
2	Understand the tenses and its use in daily life
3	Explain basic uses of speeches and voices in day to day life
4	Understandthe use of modal verbs in sentence construction
5	Summarize various Phrases, Idioms and Proverbs
6	Summarize different words used in daily life

Course Contents:

Unit 1: English Grammar **[2]**

Structure and Types of Sentence, Conditional Sentences

Unit 2: Tenses **[2]**

Present tense, Past tense, Future tense, Use of Tenses in Sentence forming

Unit 3: Speeches and Voices **[2]**

Direct and Indirect Speech, Active and Passive Voice

Unit 4: Modal **[2]**

Use of Modal verbs in Sentence Forming, Substitution and Elimination

Unit 5: Proverbs, Idioms and Phrases **[2]**

Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence

Unit 6: Vocabulary **[2]**

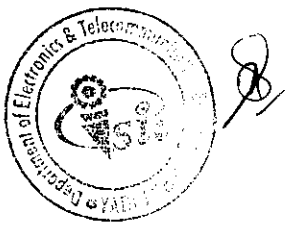
Vocabulary Building in Various Situations

Text Books:

1. Raymond Murphy, Essential English Grammar with Answers, Murphy
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:

1. RaoN,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017
2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press;Second edition



11. Language Skill-I

Teaching Scheme:	Examination Scheme:
Lecture: NA Tutorial: NA Practical: 2 hrs/week	Mid Semester Exam: NA End Semester Exam: NA Term Work: 25 Oral Exam: NA Practical and Oral Exam:NA

Pre-Requisites: Communication Skills

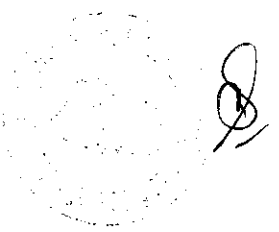
Languages (Any One)

C Programming (Technical Language) (24Hrs)

Syllabus for C Programming

Course Objectives:

This course provides an opportunity to enhance acquisition of the fundamental elements of the C programming language. Emphasis is on the progressive development of basic programming syntaxes and essentials used in C programming



Course Outcomes: At the end of the course, students will be able to:

1	Explain fundamentals & essentials of C programming.
2	Illustrate Types, Operators and Expressions.
3	Make use of Decision Making and Looping Statements
4	Make use of Arrays in C programming.

Unit 1: Basics of C **[6]**

Editing, Compiling, Error Checking, executing, testing and debugging of Programs, Flowcharts, Algorithms, Structure of C Program.

Unit 2: Types, Operators and Expressions **[6]**

Variable names, Data types, sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

Unit 3: Decision Making and Looping Statements **[6]**

Statements and Blocks. If-else, else-if switch Loops while and for, do-while break and continue go to and Labels.

Unit 4: Arrays **[6]**

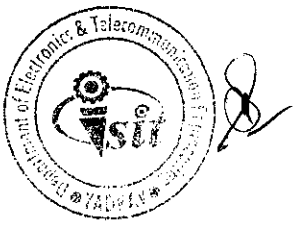
Initializing arrays, Initializing character arrays ,two dimensional and multidimensional arrays.

Text Books

1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Peasrson Publication

Reference Books

1. C: The Complete Reference, McGraw Hill Education; 4th edition (1 July 2017)
2. C Programming in easy steps, 5th Edition, In Easy Steps Limited
3. The C Programming Language, Second Edition, By PearsonEducation India (1 January 2015)



Japanese Language Course I (24Hrs)

Course Objectives:

This course is designed to introduce students to the everyday language of Japan. Lessons will be organized around natural conversational topics, leading students from fundamental aspects of grammar to readings in simple texts.

Course Outcomes: At the end of the course, students will be able to:

1	Explain the history and scripts used in Japanese
2	Translate simple English words into Japanese
3	Express themselves by using simple sentences and responses to questions.
4	Demonstrate Japanese scripts through oral and written communication.

Course Contents:

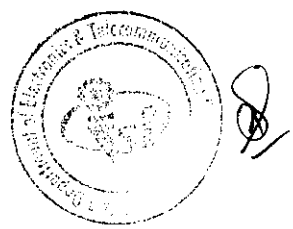
Unit 1: Introduction **[6]**

Brief history of Japan, Japanese Language, Introduction of three scripts in Japanese, viz.

Hiragana, Katakana, and Kanji, Days of the week, Basic Numerals, and months of the year,

Unit 2: Simple Word forming **[6]**

Demonstratives in Japanese, Writing simple words in Hiragana, Writing all types of words, and simple sentences in Hiragana, Verbs in Japanese,



Unit 3: Simple sentence forming **[6]**

Introduction of Katakana, Formation of simple sentences involving asking and answering questions, Basic Conversational skills. Asking and answering questions based on the topics studied, Introduction of few simple Kanji, and their use in sentences based on the pattern "---ni---gaarimasu".

Unit 4: Simple interactions **[6]**

Translations from, and into Japanese, Reading an unseen paragraph, and answering questions based thereon, General revision

Text Book:

1. NihongoShoho I (Japan Foundation Publ.)
2. GENKI I: An Integrated Course in Elementary Japanese (English and Japanese Edition)
3. Japanese for Busy People I: Kana Version (Japanese for Busy People Series) 3rd Edition

Reference Book:

1. Minna No Nihongo I (3A Corporation, Japan)
2. Japanese from Zero! 1: Proven Techniques to Learn Japanese for Students and Professionals 6th Editionby George Trombl

Foreign Languages (Any One)

German Language Course I (24Hrs)

Course Objectives:

This course provides an opportunity to enhance acquisition of the fundamental elements of the German language. Emphasis is on the progressive development of basic listening, speaking, reading, and writing skills through the use of supplementary learning media and materials.

Course Outcomes: At the end of the course, students will be able to:

1	Summarize the simple German words used for daily used words
2	Translate simple English words into German
3	Express themselves by using simple sentences and responses to questions.
4	Demonstrate German scripts through oral and written communication.

Course Contents:

Unit 1: Introduction **[6]**

Introduction of the language, Greetings, Introduce oneself, speaking about yourself and others, numbers, E-mail address, Alphabets, speaking about countries and languages, Speaking about Hobbies, to have an informal appointment, learning weekdays, months and seasons

Unit 2: Simple Word forming **[6]**

Speaking about professions, work and wartimes, learning to fill up a profile in German, Learning to name the famous places, buildings in a city, learning definite/ indefinite and negative articles in German, to name the modes of transportation, To learn to describe the way, to understand the texts with international words.

Unit 3: Simple sentence forming [6]

To speak about food, to plan a shopping, conversation with the shopkeeper, Conversation about the food, about likes and dislikes, to understand the "w" questions, To understand the watch timings , giving information about time,speaking about the families, to plan a date

Unit 4: Simple interactions [6]

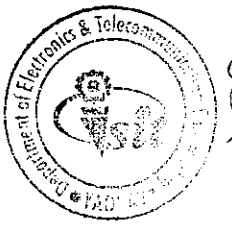
Learning about punctuality in Germany and howto excuse for delay,telephonic conversation about the appointments, To plan something together, speaking about birthday, to understand invitation and to write an invitation, to order and to pay in restaurant, to speak about own experiences, To understand particular information from the texts, to understand about different events and events relatedinformation in Radio

Text Books

1. NetzwerkArbetisbuch A1 Goyal Publisher.
2. "The Everything Learning German Book: Speak, Write and Understand Basic German in No Time" by Ed Swick
3. "German Made Simple: Learn to Speak and Understand German Quickly and Easily"

Reference Books

1. by Eugene Jackson and Adolph Geiger
2. "Hammer's German Grammar and Usage" (Fifth Edition) by Professor Martin Durrell
3. "Learn German with Stories: Café in Berlin" by André Klein



12. Mini Project - I

ETCMNP1	PROJ2	Mini Project - I	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs/week	Mid Semester Exam: -- End Semester Exam: -- Term Work: -- 25 Marks Oral Exam: -- Practical and Oral Exam: --

Pre-Requisites: NA

Course Outcomes: At the end of the course, students will be able to:

CO1	To expose the students to use the engineering approach to solve the real time
CO2	To learn the skills of team building & team work.
CO3	Defend the opinions and scope of the project work effectively

Mapping of course outcomes with program outcomes

Course Outcomes	Program Outcomes													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3									3	
CO2					3	3			3		3			3
CO3							3	3		3		3		

Term Work:

1. The term work shall consist of submission of mini project report
2. Project work shall be based on any of the following:

Project Load:	Maximum 4 to 5 students in one group are allowed.
	A batch of 9 students shall work under one faculty member.
	Group of one student is not allowed under any circumstances.

13.Internship/Field training

ETC410	INT/FT	Internship/Field training	0-0-0	Audit

13.Internship/Field training

ETC410	INT/FT	Internship/Field training	0-0-0	Audit

Teaching Scheme:	**Examination Scheme:**
Lecture: -- Tutorial: -- Practical: --	Mid Semester Exam: -- End Semester Exam: -- Term Work: 25 Marks

Course Objective

1. To expose the students to actual working environment of industry
2. To enhance the knowledge and skill of the students in the practical field
3. To expose students to modern technology used in the industry
4. To enhance employability of the students

Course Outcome Students will be able to

1. Apply fundamental concepts of electronics and telecommunication engineering.
2. Cope up with the latest changes in technological world.
3. Identify, formulate and model the problems and find engineering solution based on system approach
4. Solve the problems of Socio-Economical, Cultural, and Global and Environmental field as an engineer

Instruction:

Students are expected to undergo industrial training for at least four weeks at factory / design offices or in combination of these after II semester. Training session shall be guided and certified by qualified engineer / industry expert. A neat detailed report on activities carried out during training is expected. Students should undergo training in Summer Vacation after Semester II and appear at examination in Semester III. A brief report of industrial training shall be submitted. Evaluation shall be based on report and power point presentation.

1	Explain existing product with respect to product design
2	Make use of idea generation technique for product design
3	Identify and explain about simplifying product details
4	Recognize the main drivers for product design engineering
5	Describe how aesthetic and ergonomics of impacts on design engineering
6	Evaluate possible solutions of the problem

Course Contents:

Unit 1: Introduction to Engineering Product Design **(6)**

Trigger for Product/Process/System, Problem solving approach for Product DesignDisassembling existing product Sketching of components, identifying materials and their processing for final productfitting of components, understanding manufacturing as scale of the components, Reverse engineeringCase studies of products in markets (or in each discipline), underlying principles, Case studies of product failures.Re-Design, Evolution of Concept,Need for Systematic design Past methods of and design

Unit 2: Ideation **[7]**

Needs and opportunities for product,Generation of ideas, Funneling of ideas process,Conceptualization techniques–Idea generation – ideation, brainstorming,Concepts screening, Concept testing - exploratory tests,Market research for need, competitions,Scale and cost, Initial specificationsof products,Short-listing of ideas for product(s) as an individual or group of individuals

Unit 3: Conceptualization [7]

Drawing of parts and synthesis of a product from its component parts, CAD system evaluation, Fundamentals of 3D modeling, Parametric modeling of product, Detail engineering drawings of components,3-D visualization of products,Rendering the designs for 3-D visualization

Unit 4: Testing and Evaluation [6]

Prototyping, Importance of Prototyping, **Product** architecture, Prototype testing and evaluation, Prototypingevaluation, Feedback to design processes,Process safety and materials, Health and hazard of process operations,

Unit 5: Aesthetic and Ergonomic consideration in Design [7]

Basic types of product forms, designing for appearance,aesthetic design principles Design features, shape, Materials, Finishes,proportions,Symmetry,Contrast etc.Morgon's color code,Ergonomic considerations, Relation between man, machine and environmental factors., Design of displays,Design of controls,Practical examples of productsor equipments using ergonomics

Unit 6: Product Design and Development [7]

Product Design and Development: Role of Product Development in competitiveness.Product Life Cycle (PLC), Tools for efficient product development.Concurrent engineering, Design for Manufacturing,Design for Assembly,Disposal of product and waste. Mass customization

Text Books:

1. "Product Design and Development", Karl T. Ulrich, Steven G. Eppinger; Irwin Tata McGraw Hill, 3rd Edition.

2. "Product Design and Manufacturing", A.C. Chitale and R.C. Gupta, Prentice Hall of India, 3rd Edition

. 3. "Product Design", Otto and Wood, Pearson education. 4. "Human Factor Engineering", L P Singh, Galgotia Publication Pvt.Ltd, 1st Edition.

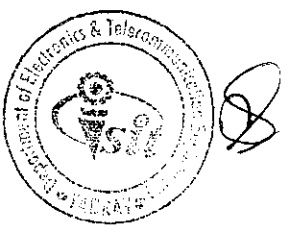
References book:-

1. New Product Development, Tim Jones, Butterworth, Heinemann, Oxford, 1997

2. Product Design for Manufacture and Assembly, Geoffrey Boothroyd, Peter Dewhurst and

Winston Knight, CRC Press, 3rd Edition, 2010.

3. Product Design: Otto and Wood; Pearson education, 2001



ShriShamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Department: Department of Electronics & Telecommunication Engineering

Rev: Course Structure/00/2021-22

Class: S.Y. B.Tech **Semester:** IV

Course Code	Type of Course	Course	Teaching Scheme					Evaluation Scheme				
			L	T	P	Credits	Total Hrs	CA1	CA2	MSE	ESE	Total
ETC401	PCC4	Analog &Digital Communication	3	-	-	3	3	10	10	30	50	100
ETC402	PCC5	Microprocessor and Microcontroller	3	-	-	3	3	10	10	30	50	100
ETC403	PEC1	Elective -I	3	1	-	4	4	10	10	30	50	100
ETC404	PCC6	Linear Integrated Circuits	3	--	--	3	3	10	10	30	50	100
ETC405	BSC6	Numerical Methods	3	--	--	3	3	10	10	30	50	100
ETC401L	PCC4L	Analog &Digital Communication Lab	--	--	2	1	2	15	15	-	20	50
ETC402	PCC5L	Microprocessor and Microcontroller Lab	--	--	2	1	2	15	15	-	20	50
ETC404L	PCC6L	Linear Integrated Circuits Lab	--	--	2	1	2	15	15	-	20	50
ETC406	MC2	Constitution of India	2	--	--	Audit	2	25	25	-	-	50
ETC407	HSMC4	Aptitude Skills-II	1	--	--	1	1	25	25			50
ETC408	HSMC5	Language Skills-II	--	--	2	1	2	25	25	-	-	50
ETC409	MNPROJ2B	Mini Project Phase-II	--	--	2	1	2	25	25	-	-	50
ETC410	INT/FT	Internship/ Field Training	--	--	--	Audit						50
			17	**0**	**10**	22	**29**	**220**	**220**	**150**	**310**	**900**

Course Category	HSMC	BSC	ESC	PCC	PEC	OEC	PROJ
Credits	2	3	-	12	4	--	1
Cumulative Sum	6	23	23	24	4	-	1

Semester IV

1. ANALOG AND DIGITAL COMMUNICATION

ETC401	PCC4	Analog and Digital communication	3-0-0	3Credits

Teaching cheme:	**Examination Scheme:**
Lecture: 3 Hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30Marks End Semester Exam: 50 Marks

Pre-Requisites: - Fundamental electronics & Fundamental Mathematics

Course Objectives:-

1. Understand the fundamental concepts and various components of analog Communication systems.

2. Understand and explain various analog modulation schemes

3. Understand the concepts of modulation and demodulation techniques of angle modulation (frequency and phase).

4. Understand the concept of AM & FM Detectors

5. Elaborate the different digital source coding techniques with the help of their lock diagrams & function.

6.Describe the baseband transmission system

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the basic concepts of the analog communication systems
CO2	Discuss modulation index, bandwidth and power requirements for various analog
CO3	Analyze various analog continuous wave modulation and demodulation techniques like
CO4	Classify various types of AM & FM Detector
CO5	Describe the channel coding techniques
CO6	Discuss the generation methods of digital modulation techniques

Course Contents:

Unit 1: Introduction to Communication System **(06)**

Block schematic of analog communication system, Simplex and duplex systems, Modes of communication: Broadcast and point to point communication, Necessity of modulation, Classification of modulation, sampling theorem and pulse analog modulation, Introduction to multiplexing-TDM, FDM.

Unit 2: Amplitude Modulation and Demodulation **(06)**

Introduction, Mathematical analysis and expression for AM, Modulation index, Frequency spectrum and bandwidth of AM, Power calculations, Generation of AM using nonlinear property, Low- and high-level modulation, Balance Modulator, Types of AM: DSB-FC, DSB-SC, SSB-SC, ISB and VSB, their generation methods and comparison,

Unit 3: Angle Modulation and Demodulation **(06)**

Introduction, Mathematical analysis of FM and PM, Modulation index for FM and PM, Frequency spectrum and bandwidth of FM, Narrow band and wide band FM, Direct and indirect methods of FM generation, Pre emphasis and de-emphasis, Comparison of AM, FM and PM.

Unit 4: AM & FM Detectors (06)

AM Detectors: Envelop detector and practical diode detector

FM Detectors: Slope detector, phase discriminator and ratio detector

Unit no 5: Source coding (06)

Quantization techniques, Study of PCM, DPCM, ADPCM, DM, ADM, CVSD

Unit 6: Carrier Modulation (06)

Block schematic of digital communication system,Amplitude Shift Keying (ASK),Frequency Shift Keying (FSK)–Phase Shift Keying (PSK),BPSK,DPSK,QPSK,Quadrature Amplitude Modulation (QAM) – 8 QAM – 16 QAM,Bandwidth, efficiency and application,Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

Term Work:

3. Continuous Assessment
4. Internal Test
5. Assignments based on topics of syllabus of ADC

Text Books:

1. Kennedy, "Electronics Communications Systems", McGraw-Hill New Delhi-1997, 4th Edition.
2. Anokh Singh, "Principles of communication engineering" S.Chand
3. Wayne Tomasi, "Electronic Communication Systems", Pearson Education-2005, 5th Edition
4. K. Sam Shanmugam- Digital & Analog Communication (John Wiley)
5. .Simon Haykin- Digital Communication (Wiley)

Reference Books:

1. Bernard Sklar, Pabitra Kumar Ray-' Digital Communications'-2nd Edition- Pearson
2. Taub- Schilling – Saha- ' Principals of communication systems' -3rd Edition-Mc Graw Hill
3. Lathi B P & Ding Z –' Modern Digital & Analog Communication Systems'- Oxford University Press, Fourth Edition
4. Ha Nguyen Ed Shwedyk-A First Course in Digital Communication – Cambridge Uni press

2.Microprocessor and Microcontroller

ETC402	PCC 5	Microprocessor & Microcontroller	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Practical: 2hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30Marks End Semester Exam: 50 Marks

Pre-Requisites: Digital Electronics.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain architecture and pin functions of 8085 microprocessor.
CO2	Explain 8085 addressing modes & instruction set and build simple assembly language programs.
CO3	Make use of 8085 and 8255 to interface external peripherals.
CO4	Develop assembly language program for arithmetic & logical operations using 8051
CO5	Apply concepts of serial communication, timers & interrupts using I/O ports.
CO6	Make use of 8051 for interfacing External Peripherals.

Course Contents:

Unit 1: Introduction to 8085 Microprocessor (6 Hrs.)
8085 architecture, Registers, pin functions, De-multiplexing of Address/Data bus, Interrupt Structure & Interrupt Types.

Unit 2: Programming with 8085 (8 Hrs.)
Addressing modes, Instruction set, Stack & Subroutine, Introduction to Timing diagram-T-state, Machine Cycle, Assembly language programming,

Unit 3: Interfacing with 8085 (6 Hrs.)
Memory Interfacing: RAM, ROM, Introduction to 8255, Block Diagram, Pin Diagram, Interfacing and Programming for LED, DC Motor

Unit 4: 8051 Microcontroller Architecture And Instruction Set (9 Hrs.)
Functional block diagram and pin diagram of 8051, Power supply, clock and reset circuit, Program Counter and ROM space in 8051, Program and Data Memory organization, addressing modes, Instruction Set: data transfer, arithmetic and logical, program branching instructions and Boolean variable manipulation

Unit 5: On-Chip Peripherals And Programming (7 Hrs.)

Embedded C Programming: Data Types, Operators Embedded C Programming: Data Conversion, I/O Programming Timer/Counter: Operating Modes, Programming. UART: Operating Modes, Programming. Interrupt: 8051 Interrupt- External and Internal Interrupts.

Unit 6: Off-Chip Peripheral Interfacing And Programming (6 Hrs.)
Interfacing: LED, Switches and Matrix Keyboard, LCD, ADC 0808 with Analog Sensor, DAC

Term Work:

1. The term work shall consist of Continuous practical assessment, Attendance & Internal oral.

Text Books:

1. Ramesh S. Gaonkar- 1. Microprocessors Architecture, Programming and applications with 8085A
2. The 8051 Microcontroller & Embedded Systems By Muhammad Ali Mazidi & Janice Gillispie Mazidi Pearson Edition L. P .E.

Reference Books:

1. Kenneth L Short –'Microprocessors and Programmed logic'
2. Douglas V Hall-'Microprocessors and Digital Systems"
3. The 8051 Microcontroller By Ayala 3- Edition

Unit 4: 8051 Microcontroller Architecture And Instruction Set (9 Hrs.)
Functional block diagram and pin diagram of 8051, Power supply, clock and reset circuit, Program Counter and ROM space in 8051, Program and Data Memory organization, addressing modes, Instruction Set: data transfer, arithmetic and logical, program branching instructions and Boolean variable manipulation

Unit 5: On-Chip Peripherals And Programming (7 Hrs.)

Embedded C Programming: Data Types, Operators Embedded C Programming: Data Conversion, I/O Programming Timer/Counter: Operating Modes, Programming. UART: Operating Modes, Programming. Interrupt: 8051 Interrupt- External and Internal Interrupts.

Unit 6: Off-Chip Peripheral Interfacing And Programming (6 Hrs.)
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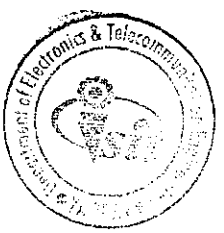


4. Elective I

ETC403	PEC1	Elective-I	3-0-1	4 Credits

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week Tutorial: 1hr/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30Marks End Semester Exam: 50 Marks

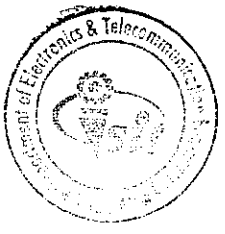
Data Structure

ETC403A	PEC1	**Data Structure**	3-0-1	4 Credits

Pre-Requisites: Basics of c programming

Course Outcomes: At the end of the course, students will be able to:

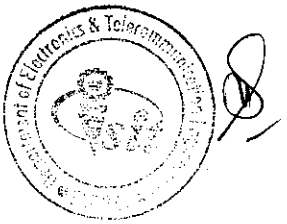
CO1	Understand the basics of data structure and its application.
CO2	Understand concepts of array and records.
CO3	Demonstrate the concepts of Linked List and apply various operations on them.
CO4	Understand concepts of stack and queue.
CO5	Demonstrate the concepts of Trees apply various operations on them
CO6	Demonstrate Basic terminologies and representation of graph.



Course Contents:

UNIT-I : Introduction & Overview (3Hrs)			
Lecture number	Objective	Content	Outcome
1	Understand the basics of data structure and its application	Introduction to data structures & its data types,	Students will be able to know Basics of data structure.
2	Understand the basics of data structure and its application	Operations	Students will be able to know the basic operation in DS
3	Understand the basics of data structure and its application	Algorithms: complexity, time space trade-off with example.	Students will be able to understand the concept of algorithm.

UNIT-2 Arrays, Records (5 Hrs)			
Lecture number	Objective	Content	Outcome
1	Understand concepts of array and records.	Introduction, linear arrays, representation of linear array in memory,	Students will be able to understand the concept of array
2	Understand concepts of array and records.	traversing linear arrays, inserting & deleting, Sorting: bubble sort,	Students will be able to understand the operations in Array
3	Understand concepts of array and records.	searching: linear search, binary search, Multidimensional arrays,	Students will be able to understand the concept of searching in array.
4	Understand concepts of array and records.	Records: Record structures, representation of records in memory	Students will be able to understand the concept of Records.
5	Understand concepts of array and records.	parallel arrays, matrices, sparce matrices.	Students will be able to understand the concept of matrices
UNIT 3 Linked Lists:: (6 Hrs)			
Lecture number	Objective	Content	Outcome
1	Demonstrate the concepts of Linked List and apply various	Introduction, linked lists & its representation	Students will be able to understand the concept of Linked list.



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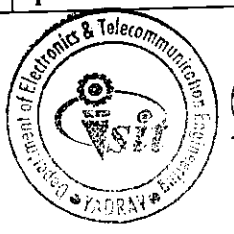
	operations on them.		
2	Demonstrate the concepts of Linked List and apply various operations on them.	Traversing & searching a linked list,	Students will be able to understand the operations in LL
3	Demonstrate the concepts of Linked List and apply various operations on them.	memory allocation, Garbage collection	Students will be able to understand the concept of Memory allocation and garbage collection in LL
4	Demonstrate the concepts of Linked List and apply various operations on them.	insertion & deletion of nodes of linked list	Students will be able to understand the operations in LL.
5	Demonstrate the concepts of Linked List and apply various operations on them.	header linked list, two-way lists	Students will be able to understand the types of LL.

UNIT 4 Stacks & Queues: (5 Hrs)			
Lecture number	Objective	Content	Outcome
1	Understand concepts of stack and queue.	Introduction to stacks, stack as an Abstract Data type	Students will be able to understand the concept of stack
2	Understand concepts of stack and queue.	representation through Arrays & linked lists ,	Students will be able to understand the representation of Stack
3	Understand concepts of stack and queue.	Applications of stacks , stacks & recursion	Students will be able to understand the applications of Stack
4	Understand concepts of stack and queue.	Queue as an abstract data type representation, circular, double ended,	Students will be able to understand the concept of Queue.
5	Understand concepts of stack and queue.	priority, Quick sort ,application of queues	Students will be able to understand the types of



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			Queue.

UNIT 5 Trees : (6 Hrs)			
Lecture number	Objective	Content	Outcome
1	Demonstrate the concepts of Trees apply various operations on them	Binary Tree: introduction, types, definition, properties, representations	Students will be able to understand the concept of Tree.
2	Demonstrate the concepts of Trees apply various operations on them	operations, binary tree traversal, Header nodes; Threads	Students will be able to understand the operations in tree.
3	Demonstrate the concepts of Trees apply various operations on them	BST, Advanced trees : AVL trees or height balanced trees, representation operation	Students will be able to understand the types of tree.
4	Demonstrate the concepts of Trees apply various operations on them	Expression trees. Multiway trees: trees	Students will be able to understand the types of tree.
5	Demonstrate the concepts of Trees apply various operations on them	multiway search trees, B trees	Students will be able to understand the types of tree
6	Demonstrate the concepts of Trees apply various operations on them	Heaps, construction of a Heap.	Students will be able to understand the Heaps

UNIT-6 Graph (5 Hrs)			
Lecture number	Objective	Content	Outcome
1	Demonstrate Basic terminologies and representation of	Introduction, Graph theory terminology	Students will be able to understand the graphs

	graph.		
2	Demonstrate Basic terminologies and representation of graph.	sequential representation of graphs: Adjacency Matrix, Path matrix	Students will be able to understand the representation of graphs
3	Demonstrate Basic terminologies and representation of graph.	Warshall's Algorithm, shortest paths	Students will be able to understand the different algorithms .
4	Demonstrate Basic terminologies and representation of graph.	linked representation. Operations Traversing	Students will be able to understand the operations.
5	Demonstrate Basic terminologies and representation of graph.	Posets, Topological sorting .	Students will be able to understand the different techniques in graphs.

Term Work:

The term work includes Assignments and Performance & results of each practical

Reference Books:

1. S. Lipschutz, Data Structures, McGraw-Hill Publication, Revised Edition.
2. Thomas Cormen, Introduction to Algorithms, PHI Publication, 2nd Edition, 2002.
3. E. Horowitz, S. Sahani, Fundamentals of Data Structures, Galgotia Publication, 1st Edition,1983.
4. Kyle Loudon, Mastering Algorithms with C: Useful Techniques from Sorting to Encryption,O'Reilly Media, 1st Edition, 1999
5. Mark Allen Weiss, Data structures and algorithms analysis in C++, Pearson Education, 4thEdition, 2013.
6. Y. Langsm, M. Augenstin, A. Tanenbaum, Data Structure using C and C++, Prentice HallIndia Learning Private Limited, 2nd Edition, 1998.
7. Trembley and Sorenson, Introduction to Data Structures, PHI Publication, 2nd RevisedEdition, 1983.

2MEMSMicro Electro Mechanical System

ETC403B	PEC 1	**Micro Electro Mechanical System**	3-0-1	4 Credits

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain basic concept of MEMS & small system.
CO2	Classify different smart materials.
CO3	Categorize different types of Transducers, Actuators & Sensors.
CO4	Explain basic fabrication steps
CO5	Determine the Micro molding of polymeric 3D structure & Polymeric process
CO6	Summarize basic mechanics of laws MEMS/NEMS energy methods.

Course Contents:

Unit 1: Control and Materials of MEMS (6)

Objective: To learn the basic fundamental of MEMS concepts

Introduction, Concepts of MEMS: Processes Principles, application and design, Scaling Properties/Issues, Ceramics, Polymers and their synthesis. Micromachining Substrates, lithography, wet/dry etching processes Mechanical Transducers: accelerometers, Pressure sensors, MEMS microphones.

Unit 2: Smart Materials and Systems: (6)

Objective: To gain knowledge of smart materials

Materials for MEMS Substrate, silicon, Silicon compound, Silicon pezoresisters, Gallium arsenide, Quartz, piezoelectric crystals, Polymers. Thermo responsive Materials, Piezoelectric Materials, Electrostrictive Management Materials, Rheological Materials.

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Unit 3: Transducers, Sensors and Actuators: (6)

Objective: To learn different types of Transducers with their classification, construction & application

Introduction, Principles of sensing and actuation. Beam and Cantilever, Micro plates, capacitive effects, MEMS Gyroscopes. Chemical and Biological Transducers: basic concepts of cellular biology, chemical sensors, molecule-based biosensors, Cell-based biosensors.

Unit 4: Basic MEMS fabrication modules (6)

Objective: Apply basic design procedure & fabrication steps to model MEMS

MEMS fabrication modules Oxidation, Deposition Techniques, Lithography (LIGA), Etching Micromachining, Surface Micromachining, Bulk Micromachining, Isotropic Etching and Anisotropic Etching, Wafer Bonding.

Unit 5: Polymeric Fabrication Techniques Microsteriolothography: (6)

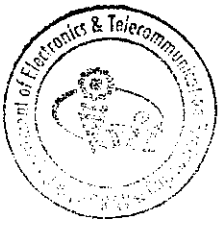
Objective: Apply basic designs MSL methods in fabrication techniques.

Introduction, MSL by scanning method, Micro molding of polymeric 3D structure: Micro molding of polymeric 3D structure: Micro-injection molding Micro-injection molding Micro-photo molding.

Unit 6: Mechanics of solids in MEMS/NEMS (5)

Objective: To gain knowledge of MEMS and NEMS

Mechanics of solids in MEMS/NEMS Strain, Stress law, Hooks' law Poisson effect Linear Thermal Expansion Bending, Energy methods

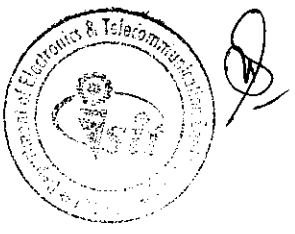


Text Books:

Nitaigour Premchand Mahalik "MEMS" McGraw-Hill.

Reference Books:

1. 1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalkrishnan K. N. Bhatt, V. K. Aatre, Micro and Smart Systems, Wiley India, 2012.
2. S. E.Lyshevski, Nano-and Micro-Electromechanical systems: Fundamentals of Nano-and Micro engineering (Vol. 8). CRC press, (2005).
3. S. D. Senturia, Microsystems Design, Kluwer Academic Publishers, 2001.
4. M. Madou, Fundamentals of Micro fabrication, CRC Press, 1997.
5. G. Kovacs, Micro machined Transducers Sourcebook, McGraw-Hill, Boston, 1998.
6. M.H. Bao, Micromechanical Transducers: Pressure sensors, accelerometers, and Gyroscopes, Elsevier, New York, 2000.



3. Computer architecture

ETC403C	PEC1	Computer Architecture	3-1-0	4 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 2hrs/week Tutorial :1 hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites:

Course Outcomes: At the end of the course, students will be able to:

1	**Explain basics of computer components and their functions.**
2	**Relate the term processor organization and information representation in computer architecture.**
3	**Illustrate the computer architecture function.**
4	**Explain memory organization of computer architecture.**
5	**Summarize I/O & interrupt organization in computer organization.**
6	**Explain the need of parallel processing.**

Course Contents:-

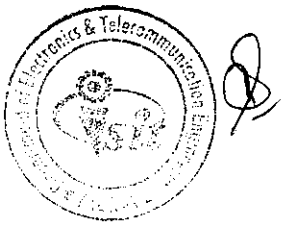
Unit 1:

Basics of Computers

Basic Structure of Computers, Functional units, software, performance issues software, machine instructions and programs, Types of instructions, Instruction sets: Instruction formats, Assembly language, Stacks, Queues, Subroutines.

Unit 2: Processor organization

Processor organization, Information representation, number formats.



Unit 3:

ALU design

Multiplication & division, ALU design, Floating Point arithmetic, IEEE 754 floating point formats Control Design, Instruction sequencing, Interpretation, Hard wired control - Design methods, and CPU control unit.

Unit 4

Memory organization

Memory organization, device characteristics, RAMS, ROM, Memory management, Concept of Cache & associative memories, Virtual memory.

Unit 5

System organization

System organization, Input - Output systems, Interrupt, DMA, Standard I/O interfaces.

Unit 6

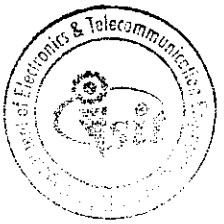
Parallel processing

Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network.

1. V.Carl Hammacher, "Computer Organisation", Fifth Edition.
2. A.S.Tanenbum, "Structured Computer Organisation", PHI, Third edition
3. Y.Chu, "Computer Organization and Microprogramming", II, Englewood Chiffs, N.J.,

TEXT/REFERENCE BOOKS

1. V.Carl Hammacher, "Computer Organisation", Fifth Edition.
2. A.S.Tanenbum, "Structured Computer Organisation", PHI, Third edition
3. Y.Chu, "Computer Organization and Microprogramming", II, Englewood Chiffs, N.J.,
4. Prentice Hall Edition
5. M.M.Mano, "Computer System Architecture", Edition
6. C.W.Gear, "Computer Organization and Programming", McGraw Hill, N.V. Edition
7. Hayes J.P, "Computer Architecture and Organization", PHI, Second edition



4. Signals and Systems

ETC403D	PEC1	Signals and Systems	3-1-0	4 Credits

Teaching Scheme:	Evaluation Scheme:
Lecture: 2hrs/week Tutorial :1 hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Mathematics III

Course Objectives:

1	Perform various operations on signals, Identify system based on various properties
2	Calculate convolution sum and convolution integral
3	Analyze periodic signals using fourier series and aperiodic signals using FT
4	Understand DTFT formulation , State and prove properties of DTFS
5	Understand basic form of Z-transform
6	Solve problems based on LT and ILT

Course Outcomes: At the end of the course, students will be able to:

1	Classify signals and perform signal transformation
2	Make use of convolution integral and convolution sum to analyze signals
3	Determine fourier series coefficients represent in trigonometric and exponential form
4	State and prove properties of DTFT
5	Determine ZT and IZT
6	Apply Laplace transform to analyze signals

Course Contents:

Unit 1: Continuous & Discrete Time Signals: [5]

Classification of Continuous time (CT/DT) signals – Even and odd, Periodic and Aperiodic, Energy and Power signals, Deterministic and Random signals, periodic signal,operations on signals, Impulse function, Interconnection of systems and system properties,

Unit 2:Analysis of Linear Time-Invariant Systems [6]

LTI systems:impulse response, convolution integral, Convolution sum, properties of LTI systems, LTI Systems described by differential equations, difference equations, Realization of systems(Direct form1,2)

Unit 3:Fourier series & Fourier Transform [7]

Fourier series representation of periodic signal, Trigonometric Fourier series (FS), Exponential FS, Properties of FS, The continuous-time,(FT) Fourier transform, FT of aperiodic signals, Properties of FT.

Unit 4:Fourier representation of Discrete-Time signals [5]

DT Fourier Series(DFTS), Properties of DTFS, DT Fourier Transform(DTFT), Properties of DTFT, Problems, Applications of FT and DTFT.

Unit 5: Z-Tansform [7]

Unilateral Z-transform(UZT) (ROC) Region of Convergence and its properties, Inverse Z-transform(IZT), Geometric evaluation of the ZT from the pole-zero plot, Properties of ZT, Analysis and characterization of LTI systems using ZT, Unilateral Z-transform(UZT).

Unit 6:Laplace Transform [6]

Laplace-Transform(LT), ROC- Region of Convergence and its properties, Inverse L-transform(ILT), Properties of LT, Problems Analysis and characterization of systems

Textbooks:

1. Ramesh Babu,R.Anandanatarajan,"Signals and Systems",Scitech publication, Fifth edition
2. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson Education, 2007.
3. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005

Reference Books:

1. Simon Haykin and Barry Van Veen "Signals and Systems", John Wiley & Sons, 2001
2. Miichael J Roberts, Govind Sharma, "Fundamentals of Signals and Systems", 2nd Edition, McGrawHill 2010

Term work based on

***Minimum 10 Tutorials (can include matlab based min 2 tutorials)**

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4. Linear Integrated Circuits

ETC404	PCC6	**Linear Integrated Circuits**	3-0-0	Credits

Teaching Scheme:	**Examination Scheme:**
Lecture: 3 hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basic Electronics & Analog Circuit

Course Objectives:

The course aims to:

1	Explain the internal circuit of operational amplifier and its electrical parameters
2	Indicate the importance of an Op-amp in building an analog computer.
3	Explain the application of Op-amps in building signal conditioning circuits, filters,waveforms generators etc
4	Develop practical skills for building and testing circuits using analog ICs.

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the characteristics of IC & op-amp parameters
CO2	Design linear and non linear applications using op-amp
CO3	Relate and Implement different converters using op-amp
CO4	Make use of op-amp to test various oscillators using op-amp
CO5	Compare different active filters using op-amp

Course Contents:

Unit I Introduction to op-amp **[06]**

Block diagram of OP-AMP, Explanations of each block, Differential Amplifier configurations, Differential amplifier analysis (AC & DC) for dual-input balanced-output configuration using 'r' parameters, level shifter, current mirror circuits, Op-Amp parameters. OP-AMP configurations, Data Sheets – μA 741, OP 177, LM 324, LM 311, LM 308, LM380 Study of TL082 Op-Amp.

Unit II Applications of op-amp **[06]**

Summing, Scaling & Averaging Amplifiers using Op-amps, Differential amplifier using op-amp, Subtractor Circuit, Instrumentation amplifier to I & I to V Converter, Precision Rectifiers, and Study of comparator, Schmitt Trigger, Clippers & Clampers, Peak Detectors,

Unit III Active Filters **[06]**

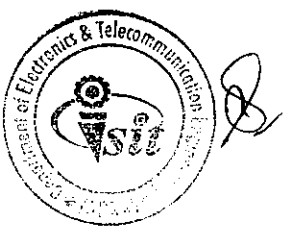
Introduction, Analysis & Design of Butterworth filters: High Pass filter, Low Pass filter (First & Second order), Band Pass filter, Band Reject filter, All Pass Filter, Introduction to Chebyshev Filter.

Unit IV Waveform Generators **[06]**

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.

Unit V Special purpose ICs **[06]**

IC 555 Timer: Block Diagram, Operating Principle, Multi-vibrator using IC 555. IC 565 PLL: Operating Principles, applications, Introduction of (block diagram, features, and application areas): IC OP177 op-amp, TL082 Texas Instruments Op-amp, IC AD620 instrumentation amplifier.



Unit VI System Design Using Op-amp **[06]**

Analog to digital Converter, Digital to analog Converter, voltage to frequency converter,

On off controller, proportional controller

Text Books:

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

Reference Books:

1. Robert Coughlin, Fredric Driscoll, "Operational Amplifiers and Linear Integrated Circuits", Sixth edition,PE, 2006.
2. David Bell, "Operational Amplifiers and Linear ICs",Thirded, Oxford University Press \
3. B. Somanathan Nair, "Linear Integrated Circuits- Analysis, Design & Applications", Wiley India.
4. T.R Ganesh Babu, "Linear Integrated Circuits" 3rd Edition, Scitech Publication
5. David. A. John & Ken Martin "Analog Integrated Circuit Design", Student Edition, Wiley
6. Sergio Franco "Design with op-amp & Analog Integrated Circuits" , 3rd Edition, Tata McGraw Hill.
7. Sergio Franco "Design with op-amp & Analog Integrated Circuits", 3rd Edition, Tata McGraw Hill.
8. S. Salivahanan & Bhaaskaran "Linear Integrated Circuits", 1st Edition, Tata McGraw Hill.

5.Numerical Methods

ETC405	BSC6	Numerical Methods	3-0-0	3 Credits

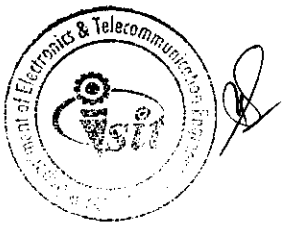
Electrical & Electronics & Tele-Communication Engineering

Teaching Scheme:	Examination Scheme:
Lecture: 3 hrs/week	CA-1 :10 Marks CA 2 :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Engineering Mathematics-I & II

Course Objectives:

1	To understand numerical methods to solve a system of linear equations.
2	To understand different numerical techniques used for solving algebraic and transcendental equations and to understand the concept of errors.
3	To understand various difference operators and interpolation techniques.
4	To understand numerical integration techniques.
5	To form a specific relation for the given group of data using least square sense method.
6	To specify probability is an area of study which involves predicting the relative likely hood of various outcomes.



Course Outcomes: At the end of the course, students will be able to:

1	Solve the system of simultaneous linear equations by direct & iterative methods.
2	Solve the algebraic and transcendental equations by numerical techniques and explain the concept of error and solve the problems related to errors.
3	Apply various interpolation methods and finite difference concepts.
4	Apply numerical integration techniques whenever and wherever routine methods are not applicable.
5	Develop basic mathematical tools for fitting of curves like linear and non-linear curve and regression.
6	Apply discrete and continuous probability distributions to various engineering problems.

Course Contents:

Unit 1: Solution of Simultaneous linear Equations [6]

Gauss elimination method, Gauss-Jordan method, Iterative method of solution- Jacobi iteration method, Gauss-Seidal iteration method, Relaxation method, Determination of Eigen values by iteration.

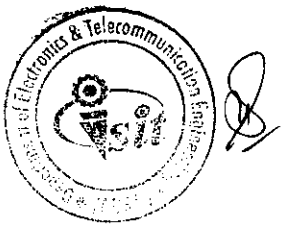
Unit 2: Numerical solution of transcendental & algebraic equations and Errors [8]

Solution of Algebraic and Transcendental Equation: Bisection method, Method of false position, Newton's method and Newton-Raphson method.

Errors: Introduction, Types of errors; Rules for estimate errors; Error propagation; Error in the approximation of function.

Unit 3: Interpolation [6]

Finite differences: Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof).



Unit 4: Numerical Integration [4]

Trapezoidal rule, Simpson's (1/3) th rule, Simpson's (3/8) th rule and Weddle's rule (without proof).Problems.

Unit 5: Curve Fitting [6]

Lines of regression of bivariate data, Fitting of Curves by method of Least-squares-Fitting of Straight lines, Fitting of Parabola & Fitting of exponential curves.

Unit 6: Probability Distributions [6]

Random variable, Probability mass function, Probability density function Binomial distribution, Poisson distribution&Normal distribution.

Text books:

1. P. N. Wartikar & J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune Vidyarthi Griha Prakashan, Pune.

2. N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi.

3. Peter O" Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore.

4. E.Balagurusamy, "Numerical Methods", TataMcGraw Hill Publications,1999.

Reference books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

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5. Analog and Digital Communication Lab

ETC401L	PCC4L	**Analog and Digital Communication Lab**	0-0-2	2 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs./week	CA1-15 CA2-15 ESE-20

Course Outcomes: At the end of the course, students will be able to:

1	Measure various parameters of AM & FM signals
2	Illustrate sampling Techniques
3	Explain Multiplexing & De multiplexing
4	Experiment with the different digital modulation techniques

Experiment list: - Any 10 experiment from given

1. To study Amplitude modulation and demodulation
2. To Study DSB modulation and Demodulation
3. To Study SSB modulation and Demodulation
4. To Study Frequency Modulation and Demodulation
5. To Study Natural Flat top sampling and reconstruction
6. To Study PWM modulation and Demodulation
7. To Study PPM modulation and Demodulation
8. To Study Amplitude Shift Keying
9. To Study Frequency shift keying
10. To Study Binary Shift Keying
11. To Study Quadrature Shift Keying
12. To Study AM Receiver

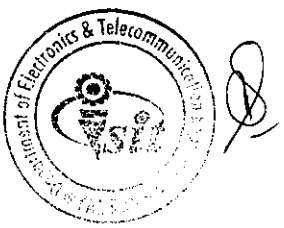
7.Microprocessor and Microcontroller Lab

ETC402L	PCC5L	**Microprocessor and Microcontroller Lab**	0-0-2	2 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs./week	CA1-15 CA2-15 ESE-20

Course Outcomes: At the end of the course, students will be able to:

1	Make use of 8085 instructions to build simple assembly language programs.
2	Apply features of 8255 to interface LEDs.
3	Develop assembly & Embedded C language programs to interface external devices to



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Experiment List:

1. Addition & Subtraction using 8085 Microprocessor.
2. Multiplication & Division using 8085 Microprocessor.
3. Block transfer & block exchange using 8085 Microprocessor.
4. I/O Mode & BSR Mode of 8255.
5. Waveform generation using DAC0808, 8255 & 8085 Microprocessor.
6. Arithmetic and Logical operations using 8051 Microcontroller.
7. LEDs Interfacing to 8051 Microcontroller with Timer Interrupt.
8. LCD Interfacing to 8051 Microcontroller.
9. Keyboard Interfacing to 8051 Microcontroller.
10. Stepper Motor Interfacing to 8051 Microcontroller.

Hardware required for practical:

1. 8051 Development Kit (Available)
2. USB to Serial Converter Cable.

Software required for practical:

1. Keil uVision3

8. Linear Integrated Circuits Lab

ETC404L	PCC6L	**Linear Integrated Circuits Lab**	0-0-2	1 Credits

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs./week	CA1-15 CA2-15 ESE-20

Course Outcomes: At the end of the course, students will be able to:

1	Select an appropriate op-amp for a particular application by referring data sheet.
2	Analyze feedback and its effect on the performance of op-amp.
3	Design, build & test linear & Non-linear circuits.
4	Experiment with various waveform generators using op-amp.
5	Design & Analyze active filters using op-amp.

List of Experiments:

(Minimum 10 experiments should be conducted out of which maximum 2 can be Simulation based)

1. Measure op-amp parameters and compare with the specifications.

(a) Measure input bias current, input offset current and input offset voltage.

(b) Measure slew rate (LM/UA741C and LF356)

(c) Measure CMRR

(d) Compare the result with datasheet of corresponding Op Amp.

2. Design of inverting, non-invertion amplifier & their frequency response

3. Design of Summing, scaling, and averaging amplifier.

4. Design of V to I convertor

5. Design, build and test differentiator and integrator

6. Design, build and test precision half & full wave rectifier.

7. Design, build and test Comparator and Schmitt trigger.

8. Design, build and test Sample and hold circuit

9. Design of Butterworth filters

10. Design, build and test PLL and any one application.

a) Study PLL IC 565.

b) Find the free running frequency.

c) Find lock range and capture range.

11. Design, build and test square & triangular wave generator.

12. Design of astable & monostable multivibrators using IC555

13. Design and implement Wien bridge oscillator using Op-Amp.

14. An application of AD620 instrumentation amplifier.

15. Design, build and test window detector.

16. Design On Off Controller/proportional Controller.

Note: Any 10 experiments/Tutorials based on above syllabus.

9. Constitution of India – Basic features and fundamental principles

ETC406	MC2	**Constitution of India**	1-0-0	Audit

Teaching Scheme:	Examination Scheme:
Practical: 1 hrs./week	CA1-25Marks CA2-25 Marks

The Constitution of India is the supreme law of India. Parliament of India can not make any law which violates the Fundamental Rights enumerated under the Part III of the Constitution. The Parliament of India has been empowered to amend the Constitution under Article 368, however, it cannot use this power to change the "basic structure" of the constitution, which has been ruled and explained by the Supreme Court of India in its historical judgments. The Constitution of India reflects the idea of "Constitutionalism" – a modern and progressive concept historically developed by the thinkers of "liberalism" – an ideology which has been recognized as one of the most popular political ideology and result of historical struggles against arbitrary use of sovereign power by state. Thehistoric revolutions in France, England, America and particularly European Renaissance and Reformation movement have resulted into progressive legal reforms in the form of "constitutionalism" in many countries. The Constitution of India was made by borrowing models and principles from many countries including United Kingdom and America. The Constitution of India is not only a legal document but it also reflects social, political and economic perspectives of the Indian Society. It reflects India's legacy of "diversity". It has been said that Indian constitution reflects ideals of its freedom movement, however, few critics have argued that it does not truly incorporate our own ancient legal heritage and cultural values. No law can be "static" and therefore the Constitution of India has also been amended more than one hundred times. These amendments reflect political, social and economic developments since the year 1950. The Indian judiciary and particularly the Supreme Court of

India has played an historic role as the guardian of people. It has been protecting not only basic ideals of the Constitution but also strengthened the same through progressive interpretations of the text of the Constitution. The judicial activism of the Supreme Court of India and its historic contributions has been recognized throughout the world and it gradually made it "as one of the strongest court in the world".

Course content

1. Meaning of the constitution law and constitutionalism

2. Historical perspective of the Constitution of India

3. Salient features and characteristics of the Constitution of India

4. Scheme of the fundamental rights

5. The scheme of the Fundamental Duties and its legal status

6. The Directive Principles of State Policy – Its importance and implementation

7. Federal structure and distribution of legislative and financial powers between the Union and the States

8. Parliamentary Form of Government in India – The constitution powers and status of the President of India

9. Amendment of the Constitutional Powers and Procedure

10. The historical perspectives of the constitutional amendments in India

11. Emergency Provisions: National Emergency, President Rule, Financial Emergency

12. Local Self Government – Constitutional Scheme in India

13. Scheme of the Fundamental Right to Equality

14. Scheme of the Fundamental Right to certain Freedom under Article 19

15. Scope of the Right to Life and Personal Liberty under Article 21.

10. Aptitude Skill-II

ETC407	HSMC4	**Aptitude Skill-II**	1-0-0	1 Credit

Aptitude Skill- II

HSMC		Aptitude Skill- II	2-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Lecture: 1hrs/week	Mid Semester Exam: 30
Tutorial: NA	End Semester Exam:50
Practical: NA	Term Work: NA
	Oral Exam: NA
	Practical and Oral Exam: NA

Pre-Requisites: Communication Skills, Aptitude Skill- I

[redacted]

Verbal Ability (12Hrs) (Compulsory)

Course Objectives:

1	To study basics of sentences and its structure
2	To study the tenses and its use in daily life
3	To study the basics of speeches and voices
4	To study the basic concepts of modal verbs
5	To study the different Phrases, Idioms and Proverbs
6	To build the vocabulary for day to day life

Course Outcomes: At the end of the course, students will be able to:

1	Understand basic concepts of sentences and its structure
2	Understand the tenses and its use in daily life
3	Explain basic uses of speeches and voices in day to day life
4	Understandthe use of modal verbs in sentence construction
5	Summarize various Phrases, Idioms and Proverbs
6	Summarize different words used in daily life

Mapping of course outcomes with program outcomes

Course Contents:

Unit 1: English Grammar [2]

Structure and Types of Sentence, Conditional Sentences

Unit 2: Tenses [2]

Present tense, Past tense, Future tense, Use of Tenses in Sentence forming

Unit 3: Speeches and Voices [2]

Direct and Indirect Speech, Active and Passive Voice

Unit 4: Modal [2]

Use of Modal verbs in Sentence Forming, Substitution and Elimination

Unit 5: Proverbs, Idioms and Phrases [2]

Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence

Unit 6: Vocabulary [2]

Vocabulary Building in Various Situations

Text Books:

3. Raymond Murphy, Essential English Grammar with Answers, Murphy
4. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:

3. RaoN,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017
4. Murphy, Intermediate English Grammar with Answers, Cambridge University Press;Second edition

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Aptitude (12Hrs) (Compulsory)

Course Objectives:

1	To study multiplications, squares, square roots, cubes and cube roots to solve aptitude problems
2	To understand the concepts of Number system
3	To study the basics of aptitude skills like percentage, average, ratio and proportion,
4	To study the various speed, time and distance basic concepts
5	To understand the concepts of business aptitude
6	To understand the Concepts of Geometry and Venn diagram in Aptitude

Course Outcomes: At the end of the course, students will be able to:

1	Understand speed math techniques to solve aptitude problems
2	Summarize number systems in detail.
3	Explain basic aptitude techniques related to Percentage, Average, Ratio Proportion and Fraction
4	Understand speed,time and distance concepts
5	Summarize the concepts of Business aptitude using basic aptitude
6	Solve the aptitude problems on Geometry and Venn Diagram

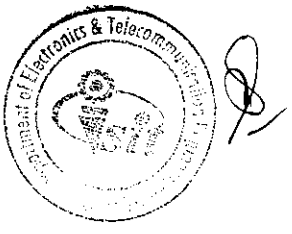
Course Contents:

Unit 1: Speed Math Techniques **[1]**

Multiplication, Squares,Square roots, Cubes, Cube roots

Unit 2: Number System **[2]**

Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions



Unit 3: Basic Aptitude [3]

Percentage, Average, Ratio and Proportion, Fraction, Partnership

Unit 4: Speed- Time- Distance [2]

Speed, Time, and Distance, Trains, Boats, Streams, Races

Unit 5: Business Aptitude [2]

Profit & Loss, Simple Interest, Compound Interest

Unit 6: Geometry and Venn Diagram [2]
2D and 3D Mensuration, Venn diagram

Text Books:

4. ArunShrama - Quantitative aptitude for CAT.
5. RS Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning,S.Chand Publisher; 2016 edition
6. RS Aggarwal, Quantitative Aptitude for Competitive Examinations, S.Chand Publisher; 2016 edition

Reference Books:

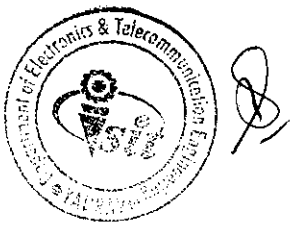
4. Fast Track Objective Arithmetic Paperback, by Rajesh Verma – 2018
5. Teach Yourself Quantitative Aptitude, Arun Sharma
6. The Pearson Guide To Quantitative Aptitude For Competitive Examination by Dinesh Khattar

11. Language Skill-II

HSMC		Language Skill- II	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Lecture: NA	Mid Semester Exam: NA
Tutorial: NA	End Semester Exam: NA
Practical: 2 hrs/week	Term Work: 25
	Oral Exam: NA
	Practical and Oral Exam: NA

Pre-Requisites: Communication Skills, Language Skill- I



Languages (Any One)

C Programming (Technical Language) (24Hrs)

Syllabus for C Programming

Course Objectives:

This course provides an opportunity to enhance acquisition of the fundamental elements of the C programming language. Emphasis is on the progressive development of basic programming syntaxes and essentials used in C programming

Course Outcomes: At the end of the course, students will be able to:

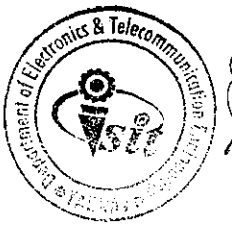
1	Illustrate the concept of Function Types, and its type
2	Make use of Structures and Unions.
3	Make use of Pointers
4	Illustrate the concept of File handling in C programming.

Unit 1: Function **[6]**

Editing, Basic of functions, Types of functions, returning non-integersexternal variables,scope rules, Recursion Function.

Unit 2: Structures and Unions **[6]**

Variable Defining a Structure, Advantage of Structure, Size of Structure, Arrays of Structures, Structures and Functions, Defining Unions.



Unit 3: Pointers [6]

Pointers to integers, characters, floats, arrays, structures.

Unit 4: File handling [6]

Initializing Introduction to dynamic memory allocation- Malloc, Calloc, Realloc, Introduction to file management, Opening/Closing a file, Input/ Output operations on Files, Error handling during I/O Operations.

Text Books

3. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
4. C Programming Language 2nd Edition, Peasrson Publication

Reference Books

4. C: The Complete Reference, McGraw Hill Education; 4th edition (1 July 2017)
5. C Programming in easy steps, 5th Edition, In Easy Steps Limited
6. The C Programming Language, Second Edition, By PearsonEducation India (1 January 2015)

Foreign Languages (Any One)

Japanese Language Course I (12Hrs)

Course Objectives:

This course is designed to introduce students to the everydaylanguage of Japan. Units will be organized around natural conversational topics, leading students from fundamental aspects of grammar to readings in simple texts. Students will learn vocabulary, expressions, and sentence structures to become able to meet basic communication needs in Japanese. This course comprises all four skills (speaking, listening, reading, and writing) of language.

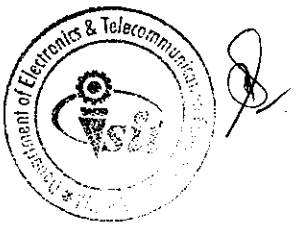
Course Outcomes: At the end of the course, students will be able to:

1	Converse in Standard Japanese to perform basic communicative tasks (e.g.,exchange greetings/personal information, give time/directions/daily activities)
2	Make use of Japanese vocabulary effectively.
3	Demonstrate reading comprehension

Course Contents:

Unit 1: basic communicative tasks **[4]**

Learning expressions involving "---ni---gaimasu" pattern, Introduction of counters, simple translations, Communicative situations—shopping, Grammar: Introduction of adjectives, na-adjectives



Unit 2: Communicative situations **[4]**

Time relations,Communicative situations-confirming schedules etc, Particles and their functional use in Japanese sentences, Reading comprehension—a story

Unit 3: Easy conversation **[4]**

Introduction of past tense aspect in r/o verbs, and adjectives, Communicative situation : asking questions and answering, Easy conversation, Overall revision, and discussion

Text Book:

4. NihongoShoho I (Japan Foundation Publ.)
5. GENKI I: An Integrated Course in Elementary Japanese (English and Japanese Edition)
6. Japanese for Busy People I: Kana Version (Japanese for Busy People Series) 3rd Edition

Reference Book:

3. Minna No Nihongo I (3A Corporation, Japan)
4. Japanese from Zero! 1: Proven Techniques to Learn Japanese for Students and Professionals 6th Editionby George Trombl

Foreign Languages

German Language Course I (12Hrs)

Course Objectives:

Choice Based Soft Skills program offers students a choice to select the course that will meet the requirements of their overall personality development. Particularly this course helps the student in developing and improving his/her literary comprehension skills.

Course Outcomes: At the end of the course, students will be able to:

1	Introduce herself or himself in German.
2	Understand alphabets, numbers in German language
3	Make basic and easy sentences required in day to day situations
4	Read, write, speak and listen basic and simple text in German.

Course Contents:

Unit 1: Introduce oneself **[3]**

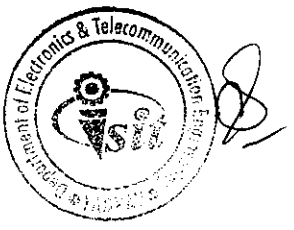
Introduction, Greetings, German Alphabets, Numbers (1 -100), Giving and asking Information related to numbers

Unit 2: Formal and Informal form **[3]**

Difference between Formal and Informal form, Personal Pronouns, verb conjugation

Unit 3: Everyday situations **[3]**

Learning about the things in the classroom, Definite, indefinite, negative articles, Possessive Articles of all the nouns



Unit 4:Simple activities **[3]**

Watch timings learning, Routine activities

Text Books

4. NetzwerkArbetisbuch A1 Goyal Publisher.
5. "The Everything Learning German Book: Speak, Write and Understand Basic German in No Time" by Ed Swick
6. "German Made Simple: Learn to Speak and Understand German Quickly and Easily"

Reference Books

4. by Eugene Jackson and Adolph Geiger
5. "Hammer's German Grammar and Usage" (Fifth Edition) by Professor Martin Durrell
6. "Learn German with Stories: Café in Berlin" by André Klein

12. Mini Project - II

ETC409	MNPROJ2B	Mini Project - II	0-0-2	1 Credit

Teaching Scheme:	Examination Scheme:
Practical: 2 hrs/week	CA1:25Marks CA2:25Marks

Pre-Requisites: NA

Course Outcomes: At the end of the course, students will be able to:

CO1	To expose the students to use the engineering approach to solve the real time
CO2	To learn the skills of team building & team work.
CO3	Defend the opinions and scope of the project work effectively

Term Work:

1. The term work shall consist of submission of mini project report
2. Project work shall be based on any of the following:
   Modeling of any real time product.
   DIY projects that include engineering touch will also appreciated
   The subject content of the mini project shall be from emerging/thrust areas, topic of current relevance
   Mini Project-II work may be continuation of Mini Project-I

Project Load:	Maximum 4 to 5 students in one group are allowed.
	A batch of 9 students shall work under one faculty member.
	Group of one student is not allowed under any circumstances.

13. Internship/Field training

ETC410	----	**Internship/Field Training**	----	Credits: -

Teaching Scheme:	**Examination Scheme:**
Lecture: NA	Audit

Course Description:-
Internship / Training is educational and career development opportunity, providing practical experience in a field or discipline. At the end of the fourth semester, every student should undergo practical training in an industry / professional organization / Research laboratory with the prior approval of the HoD/TPO/Principal of the college and submit the report along with thecompletion certification from the Industry/ Organization. The report will be evaluated during the fifthsemester by the department.
Course Learning Outcomes:-
After successful completion of the course, students will be able to
1. Verify the Technical knowledge in real industrial situations.
2. Develop interpersonal communication skills.
3. Discuss activities and functions of the industry in which the Internship/training has done.
4. Write the technical report.
Prerequisite: - Basics of Electronics and Telecommunication Engineering, Good written and Oral Communication.
Guideline for Students:-
1. Arrive at work as per schedule, ready to work and stay for the agreed upon time.
2. Present yourself in a professional manner at all times, including being appropriately dressed at workplace.
3. Communicate any concerns with your supervisor and the internship/Training coordinator in a timely manner and respectfully.
4. Demonstrate enthusiasm and interest in what you are doing, ask questions and take the initiative as appropriate.
5. Complete and submit assigned tasks by designated timelines. Meet all deadlines.
Student's Diary/ Daily Log
The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning

abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.
The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor.
Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the SITCOE immediately after the completion of the training. It will be evaluated on the basis of the following criteria:
• Regularity in maintenance of the diary.
• Adequacy & quality of information recorded.
• Drawings, sketches and data recorded.
• Thought process and recording techniques used.
• Organization of the information.
Internship Report
After completingthe internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the training period. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The competent authority should sign the training report. The Internship report should be evaluated on the basis of following criteria:
i. Originality.
ii. Adequacy and purposeful write-up.
iii. Organization, format, drawings, sketches, style, language etc.
iv. Variety and relevance of learning experience.
v. Practical applications, relationships with basic theory and concepts taught in the course.
Evaluation of Internship/Training
The student should be evaluated based on his training report and presentation, before an expert committee constituted by the concerned department as per norms. The evaluation will be based on the following criteria:
• Quality of content presented.
• Proper planning for presentation.
• Effectiveness of presentation.
• Depth of knowledge and skills.
• Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.

4. Industrial Design for Engineers: Mayall W.H, London, Hiffee books Ltd, 1988.

5. Applied Ergonomics, Hand Book: Brian Shekel (Edited) Butterworth Scientific, London