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

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Department: Electronics &Telecommunication Engg **Rev:** Course Structure/00/2021-22

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

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
ET301	BSC	Engineering Mathematics-III	3	1	-	4	10	10	30	50	100	4
ET302	PCC	Electronic Devices and Circuits	3	-	-	3	10	10	30	50	100	3
ET303	PCC	Digital Logic Design	3	-	-	3	10	10	30	50	100	3
ET304	PCC	Network Analysis	4	-	-	4	10	10	30	50	100	4
ET305	ESC	Transducers and Measurements	3	-	-	3	10	10	30	50	100	3
ET306	PCC	Electronic Devices and Circuits Laboratory	-	-	2	2	15	15	-	20	50	1
ET307	PCC	Digital Logic Design Laboratory	-	-	2	2	15	15	-	20	50	1
ET308	ESC	Transducers and Measurements Laboratory	-	-	2	2	15	15	-	20	50	1
MDC02	MC	Environmental Sciences	2	-	-	2	25	25	-	-	50	Audit
HMS01	HSMC	Aptitude Skills - 1	1	-	-	1	25	25	-	-	50	Audit
HMS02	HSMC	Language Skills - I	-	-	2	2	25	25		-	50	Audit
PRJ02	PROJ	Mini Project - II	-	-	2	2	25	25		-	50	Audit
		Total	**19**	**1**	**10**	**30**	**195**	**195**	**150**	**310**	**850**	**20**

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Department: Electronics &Telecommunication Engg **Rev:** Course Structure/00/2021-22

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

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
ET401	PCC	Analog &Digital Communication	3	-	-	3	10	10	30	50	100	3
ET402	PCC	Microprocessor and Microcontroller	3	-	-	3	10	10	30	50	100	3
ET403	PEC	Elective -I	4	-	-	4	10	10	30	50	100	4
ET404	PCC	Linear Integrated Circuits	3	-	-	3	10	10	30	50	100	3
ET405	BSC	Numerical Methods	3	-	-	3	10	10	30	50	100	3
ET406	PCC	Analog &Digital Communication Laboratory	-	-	2	2	15	15	-	20	50	1
ET407	PCC	Microprocessor and Microcontroller Laboratory	-	-	2	2	15	15	-	20	50	1
ET408	PCC	Linear Integrated Circuits Laboratory	-	-	2	2	15	15	-	20	50	1
MDC01	MC	Constitution of India	2	-	-	2	25	25	-	-	50	Audit
HMS03	HSMC	Aptitude Skills - II	1	-	-	1	25	25	-	-	50	Audit
[redacted]S04	HSMC	Language Skills - II	-	-	2	2	25	25	-	-	50	1
PRJ03	PROJ	Mini Project - III	-	-	2	2	25	25	-	-	50	1
IFT01	PROJ	Industrial Training / Field Training - I	-	-	-	-	-	-	-	-	50	Audit
		Total	**19**	**-**	**10**	**29**	**195**	**195**	**150**	**310**	**900**	**21**

Elective-I

A. Data Structure
B. Micro Electro Mechanical System (MEMS)
C. Computer Architecture

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Semester III

1. Engineering Mathematics-III

ET301	BSC	Engineering Mathematics-III	3-1-0	4 Credits

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

Pre-Requisites: Engineering Mathematics-I & II

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 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.	[8]

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Unit 2: Inverse Laplace Transform 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.	[7]
Unit 3: Partial Differential Equations and Their Applications 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: $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$).	[8]
Unit 4: Fourier Series 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.	[7]
Unit 5: Fourier Transforms Fourier Transforms, Fourier Sine and Cosine Transforms, Complex form ofFourier Integral, Finite Fourier Sine and Cosine Transform.	[6]
Unit 6: Z Transform Definition, properties of z transform, Z Transform of basic sequences, Z transform of some standard discrete function inverse Z transform.	[6]

Text Books:

1. P. N. Wartikar& J. N. Wartikar, A Text Book of Applied Mathematics (Vol I & II), Pune VidyarthiGrihaPrakashan, 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.
5. Peter O" Neil, A Text Book of Engineering Mathematics, Thomson Asia Pvt. Ltd., Singapore.

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2. Electronic Devices and Circuits

ET302	PCC	**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

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:

Unit 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.	[6]
Unit 2: BJT Overview: Physical structure, Transistor currents: JFET: 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.	[6]
Unit 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	[6]

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

Text Books:

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.

Reference Books:

1. David A. Bell, "ElectronicDevicesandCircuits",5thEdition, Oxford press
2. R. L. Boylstad, L. Nashlesky, "Electronic Devices and circuits Theory", 9thEdition, Prentice Hall of India, 2006.
3. Anil K. Maini and Varsha Agarwal "Electronic Devices and Circuits", Wiley India
4. Phillip E. Allen, Douglas R. Holberg, "CMOS Analog Circuit Design", Second Edition, Oxford. K. R. Botkar, "Integrated Circuits", 5th Edition, Khanna Publication

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3. Digital Logic Design

ET303	PCC	Digital Logic Design	3-0-0	3 Credits

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

Pre-Requisites: Basic Electronics

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 like adder, subtractor, multiplexer.
CO3	Interpret about semiconductor memories & PLD's.
CO4	Implement sequential logic circuits like shift registers, counters
CO5	Apply FSM models to design to building blocks likes sequence detector.
CO6	Make use of VHDL and simulation tool to design digital logic circuits.

Course Contents:

Unit 1: Fundamentals of Digital Electronics: 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.	[6]
Unit 2: Design of Combinational Circuits: 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.	[6]
Unit 3: Digital Logic Families: Classification of Logic Families ,Characteristics of TTL & CMOS Logic families & their comparison of TTL & CMOS logic families, CMOS inverter, static & dynamic characteristics, NAND & NOR gates. Study of Semiconductor Memories: RAM ROM, EPROM, and PAL & PLA.	[6]

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Unit 4: Sequential Logic Circuits: 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.	[6]
Unit 5: FSM Design: FSM, Moore/Mealy machines, state diagram, state table, state assignment, state reduction, sequence detector.	[6]
Unit 6: Introduction to VHDL: Levels of abstraction, Digital system design flow, HDL's, Type of modeling - Structural and behavioral and data flow, difference between VHDL & Verilog.	[6]
Text Books: 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: 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.	

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4. Network Analysis

ET304	PCC	Network Analysis	4-0-0	4 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: Physics

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

1	Classify network elements & apply mesh & node analysis.
2	Make use of metwork theorems to analysis linear circuits.
3	Determine two port network parameters & interrelation between parameters.
4	Explain the concept of series and parallel resonance and define selectivity, bandwidth & quality factor.
5	Apply laplace transform to find transient response as RLC circuit.
6	Design and analysis different filters.

Course Contents:

Unit 1: Basic Concepts: 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.	[6]
Unit 2: Network Theorems: Maximum Power Transfer Theorem, Principle of Dual Networks, Analysis of Networks using Superposition theorem, Reciprocity Theorem, Thevenin's Theorem, Norton's, Theorem, Millman's Theorem, Tellegen's Theorem.	[6]
Unit 3: Two port network: Two port networks (z, y) Two port networks parameters, interrelationship between parameters, cascade connection of two port networks.	[6]
Unit 4: Resonance: Definition, Types: series & parallel resonance. Series resonance- resonant frequency, variation of impedance, admittance, current & voltage across L & C with respect to frequency, Effect of resistance on frequency response, Selectivity, B.W. & Quality factor. Parallel resonance – Anti resonance frequency, variation of impedance & admittance with frequency, Selectivity & B.W.	[8]

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Unit 5: Transient Analysis in Networks: Behaviour 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.	[8]
Unit 6: Filters: Definitions, classification & characteristics of different filters, filter fundamental such as attenuation constant, phase shift, propagation constant, characteristic impedance, decibel, neper. Design & analysis of constant K, M derived & composite filters (low pass, high pass, band pass & band stop filters): T & Pi sections.	[8]

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 Kinmerly 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.

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5. Transducers and Measurements

ET305	ESC	Transducers & 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 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 1: Transducers & Sensors: 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.	[6]
Unit 2: Signal Conditioning & Data Acquisition System: 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.	[6]
Unit 3: Instrumentation Techniques: Introduction to Process Instrumentation, Instrumentation set up for measurement of non electrical quantity such as weight using strain gauge.	[6]
Unit 4: Introduction to Measurement: 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	[6]

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frequency meter , Q meter, Instrument calibration.	
Unit 5: Measurement & Display Devices: 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.	[6]
Unit 6: Bridges: Measurement of Resistance with Bridges, Wheatstone's Bridge, Kelvin Double Bridge, AC Bridges such as Haye's Bridge, Wein Bridge, Maxwell's-Wein Bridge, Maxwell' L/C Bridge, Descourty's Bridge & Schering Bridge.	[6]
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	

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6. Electronic Devices and Circuits Laboratory

ET306	**PCC**	**Electronic Devices and Circuits Laboratory**	**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:-

Sr. No.	Title of Experiment
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.	Simulate frequency response of single stage common source amplifier and find bandwidth.
4.	Simulate Voltage series feedback amplifier
5.	Implement LC oscillator using FET
6.	Simulate MOSFET 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.

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6. Digital Logic Design Laboratory

ET307	PCC	Digital Logic Design Laboratory	0-0-2	1 Credit

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)

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	2	2	2	-	-	-	-	1	1	-	-	1	2	1
CO2	2	2	2	-	-	-	-	1	1	-	-	1	2	1
CO3	2	2	2	-	1	-	-	1	1	-	-	1	2	1

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Experiment List:

Sr.No	Title 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 and any one from Expt. No. 14 or 15 is compulsory.**

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8. Transducers and Measurements Laboratory

ET308	ESC	Transducers & Measurements Laboratory	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

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	2	2	-	-	-	-	-	1	1	-	-	1	1	-
CO2	2	2	-	-	-	-	-	1	1	-	-	1	1	-
CO3	2	2	-	-	-	-	-	1	1	-	-	1	1	-

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Experiment list:

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

- **Minimum 8 experiments from above list.**

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9. Environmental Sciences

MDC02	MC	Environmental Sciences	2-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: 2 hrs./week Lecture: NA Tutorial: NA	CA1: - 25 CA2: - 25

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: Definition, scope and importance, Multidisciplinary nature of environmental studies. Need for public awareness.	[2]

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Unit 2: Natural Resources and Associated Problems: a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. d) Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy. e) Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. f) Role of individuals in conservation of natural resources	[6]
Unit 3: Ecosystems: Concept of an eco-system. Structure and function of an ecosystem. Producers, consumers and de composers. Energy flow in the eco system. 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	[4]
Unit 4: Biodiversity: 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.	[4]
Unit 5: Environmental Pollution and Environmental Protection: 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.	[4]

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

Text/Reference 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
3. Brunner R.C.,1989, Hazardous Waste Incineration, McGraw Hill Inc.480p

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Aptitude Skills-I

HMS01	HSMC	Aptitude Skills-I	1-0-0	1 Credit

Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week Tutorial: NA Practical: NA	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Communication Skills

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

CO1	Understand speed math techniques to solve aptitude problems
CO2	Summarize number systems in detail.
CO3	Explain basic aptitude techniques related to Percentage, Average, Ratio Proportion and Fraction
CO4	Understand speed, time and distance concepts
CO5	Summarize the concepts of Business aptitude using basic aptitude
CO6	Solve the aptitude problems on Geometry and Venn Diagram

Unit 1: Speed Math Techniques Multiplication, Squares, Square roots, Cubes, Cube roots	[1]
Unit 2: Number System Types of Number System, Last Digit Method, BODMAS Calculation, HCF and LCM, Progressions	[2]
Unit 3: Basic Aptitude Percentage, Average, Ratio and Proportion, Fraction, Partnership	[3]
Unit 4: Speed- Time- Distance Speed, Time, and Distance, Trains, Boats, Streams, Races	[2]
Unit 5: Business Aptitude Profit & Loss, Simple Interest, Compound Interest	[2]

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

Text Books:

1. Arun Shrama - 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

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Language Skill- I

HMS02	HSMC	Language Skills- I	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Lecture: NA Tutorial: NA Practical: 2 hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Communication Skills

Languages (Any One)

C Programming (Technical Language) (24Hrs)

Syllabus for 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.

Course Contents:

Unit 1: Basics of C Editing, Compiling, Error Checking, executing, testing and debugging of Programs, Flowcharts, Algorithms, Structure of C Program.	[6]
Unit 2: Types, Operators and Expressions 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	[6]

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Unit 3: Decision Making and Looping Statements Statements and Blocks. If-else, else-if switch Loops while and for, do-while break And continue go to and Labels.	**[6]**
Unit 4: Arrays Initializing arrays, Initializing character arrays , two dimensional and multidimensional arrays.	**[6]**

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 Pearson Education India (1 January 2015)

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Japanese Language Course I (24Hrs)

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

CO1	Explain the history and scripts used in Japanese
CO2	Translate simple English words into Japanese
CO3	Express themselves by using simple sentences and responses to questions.
CO4	Demonstrate Japanese scripts through oral and written communication.

Unit 1: Introduction 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,	[6]
Unit 2: Simple Word forming Demonstratives in Japanese, Writing simple words in Hiragana, Writing all types of words, and simple sentences in Hiragana, Verbs in Japanese,	[6]
Unit 3: Simple sentence forming 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.	[6]
Unit 4: Simple interactions Translations from, and into Japanese, Reading an unseen paragraph, and answering questions based thereon, General revision	[6]
Text Book: 1. Nihongo Shoho 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 Edition by George Trombl	

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Foreign Languages (Any One)

German Language Course I (24Hrs)

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.

Unit 1: Introduction 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	**[6]**
Unit 2: Simple Word forming 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.	**[6]**
Unit 3: Simple sentence forming To speak about food, to plan a shopping, conversation with the shopkeeper, Conversation about the food, about likes and dislikes, to understand the –wll questions, To understand the watch timings , giving information about time, speaking about the families, to plan a date	**[6]**
Unit 4: Simple interactions Learning about punctuality in Germany and how to 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 related information in Radio	**[6]**

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Text Books

1. Netzwerk Arbetisbuch 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‖ by Eugene Jackson and Adolph Geiger

Reference Books

1. Hammer's German Grammar and Usage‖ (Fifth Edition) by Professor Martin Durrell
2. Learn German with Stories: Café in Berlin‖ by André Klein

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Mini Project-II

PRJ02	PROJ	Mini Project-II	0-0-2	Audit

Teaching Scheme:	Examination Scheme:
Lecture: --NA Tutorial: -- NA Practical:2hr/week	CA-I: 25 Marks CA-II: 25 Marks

Course Outcomes at the end of the course students will be able to

CO1	Develop software and Hardware skills.
CO2	Improve technical knowledge, Team Building, communication and management.

Instructions:

Students have to submit a report to the respective guide and demonstrate the mini project for the evaluation. Students have to carry out one mini project in a group of maximum four students.

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