GOVERNMENT COLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University)
Coimbatore - 641 013

II Semester syllabi for

B. E. ELECTRONICS AND COMMUNICATION ENGINEERING

(Part Time)

2023

Regulations

OFFICE OF THE CONTROLLER OF EXAMINATIONS
GOVERNMENT COLLEGE OF TECHNOLOGY
THADAGAM ROAD, COIMBATORE - 641 013
PHONE 0422 - 2433355 FAX: +91 0422 - 2433355
E.mail: coegct@gmail.com

GOVERNMENT COLLEGE OF TECHNOLOGY, COIMBATORE – 641 013
B.E.ELECTRONICS AND COMMUNICATION ENGINEERING -PART TIME
2023 REGULATIONS
(Candidates admitted during 2023-2024 and onwards)

Second Semester

Sl. No.	Course Code	Course Title	CA Marks	End Sem Marks	Total Marks	Hours/Week			
						L	T	P	C
THEORY									
1	23PTL2Z1	APPLIED MATHEMATICS II	40	60	100	3	0	0	3
2	23PTL202	ELECTRONIC CIRCUITS	40	60	100	3	0	0	3
3	23PTL203	ANALOG INTEGRATED CIRCUITS	40	60	100	3	0	0	3
4	23PTL204	DIGITAL SYSTEM DESIGN	40	60	100	3	0	0	3
5	23PTL205	ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY	60	40	100	0	0	3	1.5
TOTAL					500				13.5

23PTL2Z1	APPLIED MATHEMATICS II *(Common to Mech, EEE & ECE)*	SEMESTER II

PREREQUISITES	L	T	P	C
NIL	3	0	0	3

Course Objectives	To focus on differential equations and Numerical Techniques which is important for comprehending engineering science.	
UNIT – I	**ORDINARY DIFFERENTIAL EQUATIONS**	**9 Periods**
Higher order linear differential equations with constant coefficients -variable coefficients: Cauchy-Euler equation, Cauchy-Legendre equation-Method of variation of parameters.		
UNIT – II	**PARTIAL DIFFERENTIAL EQUATIONS**	**9 Periods**
Formation of partial differential equations – First order partial differential equations – Standard types and Lagrange's linear equation – Homogeneous linear partial differential equations of second and higher order with constant coefficients.		
UNIT – III	**NUMERICAL DIFFERENTIATION AND INTEGRATION**	**9 Periods**
Numerical Differentiation (using Newton's interpolation formula) – Numerical integration: Trapezoidal rule and Simpson's rules (Both single and double integrals.		
UNIT – IV	**NUMERICAL SOLUTION OF FIRST ORDINARY DIFFERENTIAL EQUATIONS**	**9 Periods**
Single Step Methods : Taylor's series method-Euler's and modified Euler's methods-Runge- Kutta method of fourth order Multi Step methods - Milne's and Adam's predicator-corrector methods		
UNIT – V	**NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS**	**9 Periods**
Finite difference solution of two dimensional Laplace equation and Poisson equation- Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods)-Finite difference explicit method for one dimensional wave equation.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

1	*Veerarajan.T,* ***"Engineering Mathematics"****, Tata McGraw Hill Education (India) Private Limited, New Delhi, 2018.*
2	*P. Kandasamy, K. Thilagavathy, K. Gunavathi,* ***"Numerical Methods"****, S. Chand & Company, 3nd Edition, Reprint 2013.*

REFERENCES

1	*B.S.Grewal,* ***"Higher Engineering Mathematics"****, Khanna Publishers, New Delhi, 44th Edition, 2018.*
2	*SrimantaPal,* ***"Numerical Methods Principles, Analyses and Algorithms"****, Oxford University Press, New Delhi, I st Edition 2009.*
3	*Raisinghania.M..D,* ***"Ordinary And Partial Differential Equations"****, 20th Edition, S. ChandPublishing,2020*
4	*S.S. Sastry,* ***"Introductory methods of numerical analysis"****, PHI, New Delhi, 5th Edition, 2015.*
5	*S.Larsson and V.Thomee,* ***"Partial Differential Equations with Numerical Methods"****, Springer, 2003.*

COURSE OUTCOMES: Upon completion of the course, the students will be able to:		**Bloom's Taxonomy Mapped**
CO1	Obtain the knowledge for solving higher order linear differential equation with constant and variable coefficient techniques and simultaneous differential equation.	K3
CO2	Understand the knowledge of partial differential equations (PDEs), modeling; demonstrate accurate and efficient use of Lagrange's techniques.	K3
CO3	Demonstrate and understanding of common numerical methods and how they are used to obtain approximate solutions to polynomial and transcendental equations.	K3
CO4	Construct one-step and linear multistep methods for the numerical solution of initial-value problems for ordinary differential equations.	K3
CO5	Acquire the knowledge of principles for designing numerical schemes for PDEs in particular finite difference schemes.	K3

COURSE ARTICULATION MATRIX

a) CO and PO Mapping

COs/POs	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO2	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO3	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO4	3	3	2	2	-	-	-	-	-	-	-	2	-	1
CO5	3	3	2	2	-	-	-	-	-	-	-	2	-	1
23PTL2Z1	3	3	2	2	-	-	-	-	-	-	-	2	-	1
1 – Slight, 2 – Moderate, 3 – Substantial														

23PTL202	ELECTRONIC CIRCUITS	SEMESTER II

PREREQUISITES	CATEGORY	L	T	P	C
NIL	PC	3	0	0	3

Course Objective	To understand the functions and response of Basic Electronic circuits	
UNIT – I	**BJT AND FET AMPLIFIER**	**9 Periods**
Small Signal Hybrid π equivalent circuit of BJT – Early effect -CE, CC and CB amplifiers. - AC Load Line Analysis- Darlington Amplifier - Bootstrap technique - Cascade, Cascode configurations - FET AMPLIFIERS.CS, CD and CG amplifiers- BiCMOS circuits.		
UNIT – II	**FREQUENCY RESPONSE OF BJT AND FET AMPLIFIERS**	**9 Periods**
General Frequency Considerations- Low and High Frequency response of BJT and FET amplifiers – short circuit current gain - cut off frequency – fα, fβ and unity gain bandwidth – Miller Effect Capacitance-Multistage Frequency Effects.		
UNIT – III	**FEEDBACK AMPLIFIERS AND OSCILLATORS**	**9 Periods**
Feedback Concepts– effect of feedback on gain stability, distortion, bandwidth, input and output impedances; Types of feedback amplifiers-stability-Gain and Phase margins-Frequency compensation. OSCILLATORS: Barkhausen criterion for oscillation - Hartley &Colpitt's oscillators – crystal oscillators.		
UNIT – IV	**TUNED AMPLIFIERS AND WAVE SHAPING CIRCUITS**	**9 Periods**
Small signal tuned amplifiers – capacitor coupled single tuned amplifier – double tuned amplifier - effect of cascading single tuned and double tuned amplifiers on bandwidth – Stagger tuned amplifiers - Stability of tuned amplifiers. WAVE SHAPING CIRCUITS: Pulse circuits –RC integrator and differentiator circuits – diode clampers and clippers.		
UNIT – V	**POWER SUPPLIES AND POWER AMPLIFIERS**	**9 Periods**
Linear mode power supply – HW & FW Rectifiers – Filters- Voltage regulators- Over voltage protection - Switched mode power supply (SMPS) - Regulated DC Power Supply.Power amplifiers-Class A-Class B-Class AB-Class C-Power MOSFET-Temperature Effect- Class AB Power amplifier using MOSFET		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK

1	*Donald. A. Neamen*, ***Electronic Circuits Analysis and Design***, *3rd Edition, Mc Graw Hill Education (India) Private Ltd., 2010.*
2	*Robert L. Boylestad and Louis Nasheresky, "**Electronic Devices and Circuit Theory**", 11th Edition, Pearson Education, 2013.*

REFERENCES

1	*Millman J, Halkias.C.andSathyabradaJit, **Electronic Devices and Circuits**, 4th Edition, Mc Graw Hill Education (India) Private Ltd., 2015.*
2	*Salivahanan and N. Suresh Kumar, **Electronic Devices and Circuits**, 4th Edition, , Mc Graw Hill Education (India) Private Ltd., 2017.*
3	*Floyd, **Electronic Devices**, Ninth Edition, Pearson Education, 2012.*
4	*David A. Bell, **Electronic Devices & Circuits**, 5th Edition, Oxford University Press, 2008.*
5	*Anwar A. Khan and Kanchan K. Dey, **A First Course on Electronics**, PHI, 2006.*
6	*Rashid M, **Microelectronics Circuits**, Thomson Learning, 2007.*

23PTL203	ANALOG INTEGRATED CIRCUITS	SEMESTER II

PREREQUISITES	CATEGORY	L	T	P	C
ELECTRON DEVICES AND CIRCUITS	PC	3	0	0	3

Course Objective	Upon completion of this course, the students will be familiar with: • To understand the characteristics and applications of Operational amplifiers, data converters and operation and applications of special function ICs.	
UNIT – I	**BASICS OF OPERATIONAL AMPLIFIERS**	**9 Periods**
Differential amplifier-Differential mode gain, common mode gain and CMRR -current mirror-Widlar current mirror - Building blocks of 741 operational amplifier-I/O stages, gain stage and level translator stage of 741op-amp -Characteristics of an Ideal and practical - Operational Amplifier-Op-amp parameters, DC & AC performance characteristics- frequency response – frequency compensation.		
UNIT – II	**APPLICATIONS OF OPERATIONAL AMPLIFIERS**	**9 Periods**
Linear applications: voltage follower - inverting, non-inverting amplifiers-summing, scaling, averaging amplifiers-instrumentation amplifiers-difference amplifier **Nonlinear applications**: Integrator-differentiator-precision half wave & full wave rectifiers- peak detector-sample & hold circuit-log & anti-log amplifiers. **Open loop applications**: Comparator-zero crossing detector-Window detector-Schmitt trigger.		
UNIT – III	**OSCILLATORS AND MULTIVIBRATORS**	**9 Periods**
Barkhausen criterion- loop gain -Design of Oscillators: RC phase shift oscillator- Wien bridge oscillator-– Square wave generator - Triangular wave generator-Saw tooth wave generator - IC 555 timer: Functional block diagram and description of Astable & Mono-stable multi-vibrators using IC555 –Applications: Missing pulse detector, PWM, FSK generator, Schmitt trigger.		
UNIT – IV	**ACTIVE FILTERS AND DATA CONVERTERS**	**9 Periods**
Active filters - Sallen-Key filter structure- Design of I order and II order Butterworth filters: Low pass, High pass, Band pass filters- Switched capacitor filter- Data Converters: D/A converter – specifications - weighted resistor type, Voltage Mode and Current-Mode R 2R Ladder types - switches for D/A converters, high speed sample-and-hold circuits- A/D Converters – specifications - Flash type – Counter type - Successive Approximation type - Dual Slope type A/D converters.		
UNIT – V	**PLL AND SPECIAL FUNCTION ICS**	**9 Periods**
Operation of the basic PLL, Closed loop analysis, Voltage controlled oscillator, Monolithic PLL IC 565, application of PLL for AM detection, FM detection, FSK demodulation and Frequency synthesizing -IC Voltage regulators – Three terminal fixed and adjustable voltage regulators - IC 723 general purpose regulator - Voltage to Frequency converter- Audio Power amplifier IC.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOKS:

1	*D.RoyChoudhry and Shail Jain, **"Linear Integrated Circuits",** New Age International Pvt. Ltd.,4th Edition 2010*
2	*Ramakant A. Gayakwad, **"OP-AMPs and Linear Integrated Circuits",** 4th Edition, Prentice Hall / Pearson Education, 2015.*

REFERENCES:

1	*Sergio Franco,* ***"Design with Operational Amplifiers and Analog Integrated Circuits****", 4th Edition, Tata McGraw-Hill, 2014*
2	*Gray and Meyer,* ***"Analysis and Design of Analog Integrated Circuits",*** *Wiley International, 2009.*
3	*S.Salivahanan and V.S. Kanchana Bhaaskaran,* ***"Linear Integrated Circuits",*** *Tata McGraw Hill Publishing company Ltd, 1st Edition, 2009.*
4	*Somanathan Nair,* ***"Linear Integrated Circuits, Analysis, Design and Applications",*** *Wiley India Publishers, 1st Edition, 2009*

23PTL204	DIGITAL SYSTEM DESIGN	SEMESTER II

PREREQUISITES	CATEGORY	L	T	P	C
NIL	PC	3	0	0	3

Course Objective	To understand the theoretical and design aspects of digital circuits for designing digital system	
UNIT - I	**DIGITAL FUNDAMENTALS**	**9 Periods**
Number Systems - Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes - Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Min terms and Max terms, Karnaugh map Minimization and Quine-McCluskey method of minimization. Introduction to Verilog HDL.		
UNIT - II	**COMBINATIONAL CIRCUIT DESIGN**	**9 Periods**
Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder - Carry look ahead Adder, BCD Adder, Binary Multiplier, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.		
UNIT - III	**SYNCHRONOUS SEQUENTIAL CIRCUITS**	**9 Periods**
Flip flops - SR, JK, T, D, Master/Slave. FF operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits - Moore/Mealy models, state minimization, state assignment, circuit implementation. Design of Counters- Ripple Counters: Binary, BCD, Modulo n, Up/Down counters-Counter for Random Sequence - Shift registers: -Universal Shift Register-Synchronous counters-Ring counter-Johnson counter.		
UNIT - IV	**ASYNCHRONOUS SEQUENTIAL CIRCUITS**	**9 Periods**
Analysis and Design of Asynchronous Sequential Circuits-Reduction of Flow Tables- Stable and Unstable states, state reduction, output specifications, cycles and races, race free assignments, Hazards: Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits- Clock skews.		
UNIT - V	**MEMORY AND PROGRAMMABLE LOGIC DEVICES**	**9 Periods**
Basic memory structure: ROM –PROM, EPROM, EEPROM, EAPROM, RAM: Static and dynamic RAM - Programmable Logic Devices: Programmable Logic Array (PLA) - Programmable Array Logic (PAL) - Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA, PAL,CPLD's. TTL and CMOS Logic families.		
Contact Periods: **Lecture: 45 Periods Tutorial: 0 Periods Practical: 0 Periods Total: 45 Periods**		

TEXT BOOK

1	*M.Morris R.Mano and Michael D.Ciletti,"**Digital Design",** 4th Edition, Pearson Education,2011.*
2	*M.Morris R.Mano and Michael D.Ciletti, "**Digital Design: With an Introduction to the Verilog HDL"**, 5th Edition, Pearson Education, 2013.*

REFERENCES :

1	*Charles H.Roth., "**Fundamentals of Logic Design"**, 6thEdition,Thomson Learning, 2013*
2	*Thomas L. Floyd, "**Digital Fundamentals**",10thEdition, Pearson Education Inc,2011*
3	*S.Salivahanan and S.Arivazhagan, "**Digital Electronics**', Ist Edition, Vikas Publishing House pvt Ltd,2012.*
4	*Anil K.Maini, "**Digital Electronics"**, Wiley, 2014.8*
5	*Soumitra Kumar Mandal, "**Digital Electronics"**, McGraw Hill Education Private Limited, 2016.*

23PTL205	ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY	SEMESTER II

PREREQUISITES	CATEGORY	L	T	P	C
ANALOG CIRCUITS AND DIGITAL CIRCUTS DESIGN	PC	0	0	3	1.5

Course Objective	To Design and construct analog circuits using ICs 741 and 555 , Digital Circuits using Logic gates, Flip Flops and MSI devices.
PRACTICALS	**LIST OF EXPERIMENTS** **ANALOG IC EXPERIMENTS** 1. DC and AC Characteristics of OP-AMP. 2. Simple Applications of OP-AMP – Inverting and non-inverting Amplifier, Voltage Follower, Adder, Integrator and Differentiator. 3. Design and testing of Oscillators, Comparator and Schmitt Trigger Circuit. 4. Design and Testing of Astable and mono-stable Multivibrator using 555 Timer IC. **DIGITAL IC EXPERIMENTS** 5. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters. 6. Design and implementation of Half/Full Adder and Subtractor using Logic Gates. 7. Design and implementation of combinational circuits using MSI devices: (i) 4 – bit binary adder / subtractor (ii) Parity generator / checker (iii) Magnitude Comparator (iv) Application using multiplexers 8. Verification of Flip-Flops. 9. Design and Testing of Shift register, synchronous and asynchronous Counters.
Contact Periods: **Lecture: 0 Periods** **Tutorial: 0 Periods** **Practical: 45 Periods** **Total: 45 Periods**	

REFERENCES

1.	*D. Roy Choudhry and Shail Jain,* ***"Linear Integrated Circuits",*** *New Age International Pvt. Ltd.,4th Edition 2010.*
2.	*Ramakant A. Gayakwad,* ***"OP-AMPs and Linear Integrated Circuits",*** *4th Edition, Prentice Hall / Pearson Education, 2015.*
3.	*Morris Mano,* ***"Digital Design****",4th Edition, Pearson Education, 2011.*
4.	*A.Anand Kumar,* ***"Fundamentals of Digital Circuits",*** *2nd Edition, PHI Learning Pvt. Ltd, NewDelhi,2011.*