SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EC-3401	Electronic Devices	3 Hours	3	1	2	4 + 1	70	22

UNIT - I :

Introduction to Semiconductor Physics: Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity, sheet resistance, design of resistors.

UNIT - II :

Generation and recombination of carriers; Poisson and continuity equation P-N junction characteristics, I-V characteristics, and small signal switching models ; Avalanche breakdown, Zener diode, Schottky diode.

UNIT - III :

Bipolar Junction Transistor, I-V characteristics, Ebers - Moll Model, MOS capacitor, C-V characteristics.

UNIT - IV :

MOSFET, I-V characteristics, and small signal models of MOS transistor, LED, photodiode and solar cell.

UNIT - V :

Integrated circuit fabrication process: oxidation, diffusion, ion implantation, photolithography, etching, chemical vapor deposition, sputtering, twin-tub CMOS process.

Text/Reference Books:

1. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices." 7th edition, Pearson, 2014,
2. D. Neamen, D. Biswas "Semiconductor Physics and Devices," McGraw-Hill Education
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley &Sons, 2006.
4. C.T. Sah, "Fundamentals of solid state electronics," World Scientific Publishing Co. Inc, 1991.
5. Y. Tsividis and M. Colin, "Operation and Modeling of the MOS Transistor," Oxford Univ. Press, 2011D.J.DeFatta, J. G. Lucas and W. S. Hodgkiss, Digital Signal Processing. John Wiley & Sons, 1988.

List of Experiments :

1. To study Intrinsic and Extrinsic Semiconductor.
2. To plot forward and reverse characteristics of Si and Ge Semiconductor diode.
3. To plot forward and reverse characteristics of Zener diode.
4. To study Half wave and full wave rectifier.
5. To plot and observe input and output characteristics of common emitter BJT.
6. To plot and observe input and output characteristics of common Base BJT.
7. To study transfer and Output characteristics of an N-channel JFET in common source configuration.
8. To plot the depletion and Enhancement mode of MOSFET.
9. To plot and observe Drain characteristics of MOSFET.
10. To Study the fabrication process of transistor in IC package.

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EC-3402	Digital System Design	3 Hours	3	1	2	4 + 1	70	22

UNIT - I :

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Karnaugh maps up to 6 variables, Binary codes, Code Conversion.

UNIT - II :

MSI devices like Comparators, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display. Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Barrel shifter and ALU.

UNIT - III :

Sequential Logic Design: Building blocks like S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator, Pseudo Random Binary Sequence generator, Clock generation.

UNIT - IV :

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA. Logic implementation using Programmable Devices.

UNIT - V :

VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling. Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits.

Text/Reference Books :

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
3. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition 2006.
4. D.V. Hall, "Digital Circuits and Systems", Tata McGraw Hill, 1989
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

List of Experiments :

1. To study and Verify different types of logic Gates.
2. To verify the De Morgan's theorem and Boolean's rules.
3. To design the logic circuits of Even and Odd Parity Generator and Checker.
4. To study and design the logic circuits for Half adder and Full adder.
5. To study and design the logic circuit for Half subtractor and Full subtractor.
6. To study and verify the different types of flip-flops.
7. To study and Verify MUX and DE-MUX.
8. To study a decimal to BCD Encoder.
9. To study binary to octal decoder or 1 to 8 decoder.
10. To study the operation of a Programmable shift register.
11. To design and operate Synchronous and Asynchronous counter.

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EC-3403	Signal and Systems	3 Hours	3	1	0	4 + 0	70	22

UNIT - I :

Signals and systems as seen in every day life, and in various branches of engineering and science. Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity : additivity and homogeneity, shift-invariance, causality, stability, realizability.

UNIT - II :

Linear shift-invariant (LSI) systems, impulse response and step response, convolution, input output behavior with aperiodic convergent inputs. Characterization of causality and stability of linear shift - invariant systems. System representation through differential equations and difference equations.

UNIT - III :

Periodic and semi-periodic inputs to an LSI system, the notion of a frequency response and its relation to the impulse response, Fourier series representation, the Fourier Transform, convolution/multiplication and their effect in the frequency domain, magnitude and phase response, Fourier domain duality. The Discrete-Time Fourier Transform (DTFT) and the

UNIT - IV :

Discrete Fourier Transform (DFT). Parseval's Theorem. The idea of signal space and orthogonal bases. The Laplace Transform, notion of Eigen functions of LSI systems, a basis of eigen functions, region of convergence, poles and zeros of system, Laplace domain analysis, solution to differential equations and system behavior.

UNIT - V :

The z-Transform for discrete time signals and systems - Eigen functions, region of convergence, z-domain analysis. State-space analysis and multi-input, multi-output representation. The state-transition matrix and its role. The Sampling Theorem and its implications- Spectra of sampled signals. Reconstruction: ideal interpolator, zero-order hold, first-order hold, and so on. Aliasing and its effects. Relation between continuous and discrete time systems.

Text/Reference books:

1. A.V. Oppenheim, A.S. Willsky and LT. Young. "Signals and Systems" 1983.
2. R.F. Ziemer, W.H. Tranter and D.R. Fannin, "Signals and Systems Continuous and , Prentice Hall, Discrete", 4th edition, Prentice Hall, 1998.
3. Papoulis, "Circuits and Systems: A Modern Approach", HRW, 1980.
4. B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, c1998,
5. Douglas K. Lindner, "Introduction to Signals and Systems", McGraw Hill International Edition: c1999.
6. Simon Barry van Veen, "Signals and Systems", John Wiley and Sons (Asia) Haykin, Private Limited, c1998.
7. Robert A. Gabel, Richard A. Roberts, "Signals and Linear Systems". John Wiley and Sons, 1995.

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

Contd. … 2

8. M. J. Roberts, "Siguals and Systems - Analysis using Transform methods and MATLAB", TMH, 2003.
9. J. Nagrath, S. N. Sharan, R. Ranjan, S. Kumar, "Signals and Systems", TMH New Delhi, 2001.
10. Ashok Ambardar, "Analog and Digital Signal Processing", 2nd Edition, Brooks/ Cole Publishing Company (An international Thomson Publishing Company), 1999.

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EC-3404	Network Theory	3 Hours	3	1	0	4 + 0	70	22

UNIT - I :

Introduction to circuit element R, L, C and their characteristics in terms of linearity and time dependent nature, voltage and current sources, controlled and uncontrolled sources, KCL and KVL analysis, Nodal and mesh analysis, analysis of magnetic coupled circuits, network topology, concept of network graph, tree-tree branch and link, incidence matrix, cut set and tie set matrices, dual network and dot convention co-efficient tuned circuits, series and parallel resonance.

UNIT - II :

Network theorem for AC and DC circuits - Thevenins and Norton's, Superposition's, reciprocity, compensation, Substitution, Maximum power transfer and Millman's theorem, Tellegen's theorem, problems with dependent and independent sources.

UNIT - III :

Transient analysis:- Transient in RL, RC RLC circuit, initial conditions, time constants study state analysis, concept of phasor and vector, impedance and admittance. Frequency domain analysis- Laplace transform solution of Integro - differential equations, transform of waveform synthesized with step ramp, Gate and sinusoidal functions, Initial and final value theorem, Network theorem in transfer domain.

UNIT - IV :

Concept of signal spectra, Fourier series co-efficient of a periodic wave, symmetries as related to Fourier co-efficient, Trigonometric and Exponential form of Fourier series.

UNIT - V :

Network function and two part network- concept of complex frequency, network transfer function for one port and two ports, poles and zeros, necessary condition for driving point and transfer function. Two port parameters- Z, Y, ABCD, Hybrid parameters their inverse and image parameters, relationship between parameters, interconnection of two port network, terminated two port network, Introduction to Low Pass, High Pass, Band pass and Band reject filters.

Text/Reference books:

1. M.E. Van Val ; kendburg, Network Analysis, (PHI)
2. F.F. Kuo, Network Analysis
3. Mittal GK; Network analys ; Khanna Publications
4. Mesereau and Jackson ; Circuit analysis – A system approach Person
5. Sudhakar and Pillai ; Circuit and Network-Analysis and Synthesis : TMH
6. Hayt W. H. and J. E. Kemmerly : Engineering Circuit analysis : TMH
7. Decarlo Lin ; Linear circuit analysis : Oxford
8. William D Stanley ; Network analysis with application, Pearson education
9. Roy Choudhary D ; Network and system : new age publication
10. Charled K Alexander and Matthew N. O. Sadiku : Electrical circuit : TMH
11. Chakraborti : Circuit Theory : Dhanpat Rai
12. B. Chattopadhyay and P. C. Rakshit : Fundamental of Electrical Theory : S Chand
13. Nelson and Riedel, Electric Circuit : Pearson

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

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CHEMICAL ENGINEERING, UEC, UJJAIN.

Syllabus for Four Years Bachelor of Technology Degree Course as per NEP-2020

July-2024

SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EC-3405	Electronics Workshop	--	0	0	4	0 + 2	60	--

List of Experiments :

1. To study digital multi meter and perform testing of various components.
2. To check and test the different types of electronic components used in electronic circuit: Passive components.
3. To check and test the different types of electronic components used in electronic circuit : Acive components.
4. To study function generator and perform measurements.
5. To study cathode ray oscilloscope and perform measurements.
6. To understand the process of soldering and de- soldering.
7. To understand the PCB manufacturing process.
8. To study and verify a circuit to glow LED.
9. Study of 3D printing and various pattern making by 3D printing.
10. Study of Laser cutting and various pattern making by Laser cutting.

1 Hour Lecture (L) = 1 Credit 1 Hour Tutorial (T) = 1 Credit 2 Hours Practical (P) = 1 Credit

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Ujjain Engineering College, Ujjain (MP) 456010

SYLLABUS FOR FOUR YEARS **Bachelor of Technology** DEGREE COURSE as per AICTE Model Curriculum

(EC/EE Branches :: July 2024)

Subject Code	Subject Name	Semester	Periods per Week			Scheme of Examination			Total Marks	Credits
			L	T	P	ESE	MST	QAR		
MA 3407	Mathematics – III	III	3	1	0	70	20	10	100	4

Prerequisite: Mathematics – I, Mathematics – II

Course Objective: The goals for the course are to gain a facility with using the transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used. Together with a great variety, the subject also has a great coherence, and the hope is students come to appreciate both. This course also aims to provide an understanding of the basic concepts in probability, conditional probability and independent events. It will also focus on the random variable, mathematical expectation, and different types of distributions, sampling theory and estimation theory. Another objective of the course is to design a statistical hypothesis about the real world problem and to conduct appropriate test for drawing valid inference about the population characteristics. It is inevitable to have the knowledge of hypothesis testing for any research work. The course will provide an opportunity to learn R programming to substantial extent.

Detailed Course Contents

[Total contact hours required: 60 hours]

Module 1: Laplace Transform (9 lectures, 3 tutorials) **[Weightage 14 marks]**
Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, Solving ODEs and PDEs by Laplace Transform method.

Module 2: Fourier Transform (9 lectures, 3 tutorials) **[Weightage 14 marks]**
Fourier integrals, Fourier transform, Elementary properties, Fourier cosine and sine transform, Finite Fourier cosine and sine transforms, Fourier transform solution of some partial differential equations.

Module 3: Basic probability and distributions (9 lectures, 3 tutorials) **[Weightage 14 marks]**
Probability spaces, Conditional probability, independence; Total probability, Baye's theorem, Discrete random variables, Binomial distribution, Poisson distribution, Continuous random variables and their properties, Normal distribution, Evaluation of statistical parameters for these three distributions.

Module 4: Basic Statistics (9 lectures, 3 tutorials) **[Weightage 14 marks]**
Measures of Central tendency: Moments, Skewness and Kurtosis, Curve fitting by the method of least squares-fitting of straight lines, Second degree parabolas and more general curves. Correlation and Regression, Rank correlation.

Module 5: Applied Statistics (9 lectures, 3 tutorials) **[Weightage 14 marks]**
Tests of significance: Introduction, Sampling and standard error. Test of significance for large samples: Null and alternate hypothesis, critical region, critical value, and level of significance, confidence interval, Errors in testing of hypothesis. Tests of significance for small samples: Student's t-distribution, Snedecor's F-distribution. Chi-Square distribution: Properties, applications, test for goodness of fit, independence of attributes, test for population variance.

Suggested Text/Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. R. K. Jain, S. R. K. Iyenger, Advanced Engineering Mathematics, Narosa Publications.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.
8. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

03/08/23

3/8/23

Head of Department
Department of Mathematics
Ujjain Engg. College, Ujjain (MP)

BOS: 03/08/2023

Table 01: Course Outcomes (COs)

On successful completion of this course students will be able to:

Course Outcome #	Course Outcome
CO1	Find Laplace transform and Inverse Laplace transforms of functions using different methods/properties and able to apply them to solve initial and boundary value problems.
CO2	Find Integral representation, Fourier transforms and Inverse Fourier transforms of functions using different methods/properties and able to apply them to solve ODEs and PDEs.
CO3	Understand the concepts of probability, random variables and be familiar with some common probability distribution like Binomial, Poisson and Normal distributions and their properties.
CO4	Understand and apply the concepts of Moments, Skewness and Kurtosis, fit different curves by least square method, understand and apply the concepts of correlation and regressions.
CO5	Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.

Table 02: Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	2	1	-	-	-	-	-	-	-
CO2	3	3	1	2	1	-	-	-	-	-	-	-
CO3	3	3	1	2	1	-	-	-	-	-	-	-
CO4	3	3	1	2	1	-	-	-	-	-	-	-
CO5	3	3	1	2	1	-	-	-	-	-	-	-
MA	3	3	1	2	1	-	-	-	-	-	-	-

Table 03: Assessment Policy

S. N.	Particulars	Marks	Policy
	Mid Semester Tests		
1.	Mid Semester Test (MST)	20	At least two mid semester tests will be conducted of 20 marks each. The final mid semester marks shall be the average of the two higher mid semester marks.
	Quizzes, Assignments, Tutorials and Regularity		
1.	Quizzes	04	Two quizzes will be conducted of 2 (two) marks each
2.	Assignments	04	Two assignments will be conducted of 2 (two) marks each
3.	Tutorials and Regularity	02	Every Thursday/Friday a tutorial sheet will be given to the students. Students have to submit, solution of these tutorial sheets on the next Monday. Marks for regularity will be awarded only if the student attend more than or equal to 75%.
	End Semester Examination		
1.	End Semester Examination	70	Question paper for end semester examination will have 05 (five) questions, one from each module (unit). Internal choices will be given.

03/08/23

03/08/23

3/8/23

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