ELECTRICAL 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			
EE-3401	Signals & Systems	3 Hours	3	1	0	4	70	22

UNIT – I :

Dynamic Representation of Systems : Systems attributes causality linearity, Stability, time-invariance, Special signal complex exponentials, singularity functions (impulse and step function). Linear time invariant systems: Differential equation representation convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI systems (differential and difference equations).

UNIT – II :

Fourier Analysis of Continuous Time Signals and Systems : Fourier series, trigonometric, complex and polar forms of Fourier Series, Fourier Transform and properties, Parseval's theorem, Frequency response of continuous LTI systems.

UNIT – III :

Fourier Analysis of Discrete Time Signals and Systems : Discrete-Time Fourier series, Discrete-Time Fourier Transform (including DFT) and properties, Frequency response of discrete time LTI systems.

UNIT – IV :

Laplace Transform & its Inverse : Definition, existence conditions, Region of convergence and properties, Application of Laplace Transform for the analysis of continuous time LTI systems (stability etc.), Significance of poles & zeros. Z-Transform: Z-Transform and its inverse: Definition, existence conditions, Region of convergence and properties, Application of Z-Transform for the analysis of Discrete time LTI systems, Significance of poles & Zeros.

UNIT – V :

Sampling : The Sampling theorem, reconstruction of signal from its samples, sampling in the frequency domain, sampling of discrete-time signals.

References :-

1. Alan V. Oppenheim, Alan S. Willsky and H. Nawab. " signal & Systems", Prentice Hall, 1997.
2. Simon Haykin, "Communication Systems", 3rd Edition, John Wiley, 1995.
3. Digital signal processing, S. Salivahanan, A. Vallavaraj , C. Gnanapriya (Tata McGraw Hill.

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July-2024

SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EE-3402	Electrical Measurement	3 Hours	3	1	2	5	70	22

UNIT - I :

Measurement and Error : Method of Measurement, classification of instruments, static error and correction, static calibration, calibration curve, accuracy and precision, reproducibility and repeatability, sensitivity, threshold, resolution, loading effect due to shunt connected and series connected instruments, limiting errors & types of errors.

Electro-mechanical indicating instruments: Definition of analog and digital instruments, classification of analog instruments and their principle of operation, Electro-mechanical indicating instruments : Operating force, controlling, damping & types of supports. Galvanometer- Theory and operation of D'arsonval galvanometer, galvanometer motion & damping, sensitivity.

UNIT - II :

Analog Instruments -PMMC, MI, Electrodynamometer, Electrostatic, Induction, Rectifier type, expression for control and deflection torque, their advantages, disadvantages & error. extension of range of instruments using shunt & multiplier. Power in AC and DC circuit, electrodynamometer type of wattmeter - construction, theory, operation & error, Single Phase Induction type Energy Meter construction, operation, driving and braking torques, errors & compensations, testing by phantom loading.

UNIT - III :

Instrument Transformer - Potential and current transformer- Theory, transformation ratio & phase angle, errors, Design and constructional features, difference between CT and PT, testing of instruments transformer, application of CT and PT in measurement of power.

UNIT - IV :

Measurement of resistance - classification of resistance, voltmeter-ammeter method, Wheatstone bridge, Kelvin's double bridge, loss of charge method, earth resistance measurement, A.C. bridge - Introduction, sources and detectors, general form of an AC bridge, general equation for bridge balance, Maxwell's inductance bridge, Maxwell's inductance-capacitance bridge, Hay's bridge, Anderson's bridge, Owen's bridge, De Sauty's bridge, Schering bridge.

UNIT - V :

B-H curve & Hysterisis loop, determination of separation of Iron losses, Measurement of Iron losses by wattmeter method using Lloyd fisher square.

Potentiometer - DC potentiometer standardisation, laboratory type Crompton', potentiometer, application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

Text & Reference Books :-

1. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring instrument", A.H. Wheeler, Co. India.
2. A.K. Sawhney, "Electrical & Electronic Measurement c Instrument", Dhanpat Rai & Sons.
3. W.D. Cooper," Electronic instrument & Measurement Technique" Prentice Hall International.
4. Rajendra Prashad, "Electrical Measurement & Measuring instrument" Khanna Publisher.
5. Electrical measurements by Buckingham and price, Prentice- hall.
6. J.B. Gupta, "Electrical Measurements and Measuring lnstniments", S.K. Kataria & Sons.

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EE-3403	Circuit Theory	3 Hours	3	1	2	5	70	22

Unit-I

Introduction to circuit elements, voltage and current source and their transformation, duality of network, Superposition theorem, Thevenni's theorem, Reiprocity theorem, Milliman's therem, Maximum power transfer therem, Compensation theorem, Tellegen's therem. Application of network theorem in AC circuits.

Unit-II

Transient Analysis : Transient in R-L, R-C and R-L-C Circuit, time constant, initial conditions. Laplace Transform - Some basic theorems of Laplace transformation, LT of special signal waveforms i.e step, ramp, sinusoidal, LT application in electric circuit analysis.

Unit-III

Coupled Circuits- self and mutual inductance, Coefficient of coupling, modeling of coupled circuits, Dot convention, electrical equivalents of magnetically coupled circuits, tuned coupled circuit.

Unit-IV

Resonance of series and parallel, Q-factor, selectivity and bandwidth, half power frequencies. Locus diagram of series and parallel circuit.

Unit-V

Polyphase Circuit : Advantages of three phase system, Star-Delta connection of balanced and unbalanced circuit, Relation between line and phase voltage and currents in star and delta connection, 3-phase balance circuit, 3-phase unbalance circuit, measurement of power (one, two and three wattmeter method), and power factor of a balanced 3- phase load, measurement of reactive power by single wattmeter method, unbalanced loads.

Text/Reference Books –

1. Sudharkar & Pillai; Circuit & Networks- Analysis and Synthesis; TMH.
2. Schaums Outline Series of Electrical Circuits by J.A. Administer.
3. Van Valkenburg- Network Analysis.
4. Mittal GK; Network Analysis; Khanna Publisher.
5. Charles K. Alexander & Matthew N.O. Sadiku: Electrical Circuits: TMH.
6. Chakrabarty A. Circuit Theory (Analysis and Synthesis)

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SUBJECT		Exam Duration	Contact Hours per Week			Credits	Max. Marks	Min Pass Marks
Code	Title		L	T	P			
EE-3404	Electronics Devices & Circuits	3 Hours	3	1	2	5	70	22

UNIT - I

Transistor BIT, FET, MOSFET, types working principal characteristics and region of operation, load line, biasing method, transistor as an amplifier gain, bandwidth, frequency response.

UNIT - II

Small signal analysis of transistor (Low freq.) using h-parameters, thermal runway, and thermal stability.

UNIT - III

Large Signal Amplifier Classification of power amplifier class A, Class B, Class AB, Class C amplifier, their efficiency and power dissipation, push-pull and complimentary push-pull amplifier.

UNIT – IV

Operational amplifier - Characteristics, slew rate, band width, offset voltage, basic current, applications-inverting, non-inverting amplifier, summer, average, differentiator integrator, differential amplifier, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators, Schmitt trigger, active filters, 555 timer and its application.

UNIT – V

Feedback amplifier, negative feedback amplifier, voltage-series, voltage-shunt, current-series and current-shunt feedback, sinusoidal oscillators, R-C (Hartley-Colpitts) oscillators, R-C phase shift oscillators, Wien Bridge and crystal oscillators

References-

1. Millman & Grabel, "Micro Electronics", McGraw-Hill.
2. R.A. Gaikward; OP- Amp and linear Integreted circuit; PHI
3. Botkar, Integrated Circuits; Khanna
4. Millman Halkias, Electronic Devices and Circuits; McGraw-Hill
5. Millman & Halkias; Integrated Electronics; McGraw-Hill.

OURSE OUTCOMES: At the end of the course student will be able to:

CO1	Describe Transistors, its types and characteristics.
CO2	Derive mathematical model of BJT in small signal application using hybrid parameters.
CO3	Design Power Amplifier: Class A, Class B, Class C and Class AB.
CO4	Formulate mathematical model and construct electronic circuits like Adder, Subtractor, Integrator, Differentiator etc. using Operational amplifier.
CO5	Analyse Feedback Amplifier, oscillator, their types.

Contd. … 2

Mapping of Course outcomes (COs) with Program outcomes (POs):

Course	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE-3004.1	CO1	2	1	1	1	2	-	-	-	-	1	-	1
EE-3004.2	CO2	2	2	1	2	2	-	-	-	-	1	-	2
EE-3004.3	CO3	2	2	2	2	2	1	-	-	-	1	-	1
EE-3004.4	CO4	2	3	2	1	2	-	-	-	2	-	-	2
EE-3004.5	CO5	2	1	1	1	1	-	-	-	-	-	-	1
EE-4002 (Average)		2	1.8	1.4	1.4	1.8	0.2	0	0	0.4	0.6	0	1.4

List of Experiment :-

1. V-I Characteristics of different types of Diodes.
2. Applications of diodes and Design of various clipping and clamping circuits.
3. Design half & full wave rectifier.
4. Design & Analysis of transistor amplifier in CE, CB & CC configuration.
5. Design & Analysis of JFET Amplifier.
6. Design & Analysis of MOSFET Amplifier.
7. To study and construct power amplifiers of various classes.
8. Study of various oscillators.
9. Char, of Op-Amp (input offset voltage, slew rate CMRR, BW, Input bias current).
10. Linear application of OP-Amp (voltage follower, inviting and non-inverting an and their frequency response adder subtractor differential amplifier, integrar differential frequency response).
11. Study of Op-Amp as a comparator.
12. Design of Schmitt trigger.
13. Design of monoastable& astable multivibrator.

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ELECTRICAL 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			
EE-3406	Matlab	3 Hours	0	0	2	1	60	20

UNIT – I

MATLAB BASICS : Simulation Mechanism & simulation tools, Starting & ending MATLAB, MATLAB Desktop, Help Browser, Type of files, Mathematical functions, Matrix Generation, Array Operation & Linear Equations.

UNIT – II

INTRODUCTION TO PLOTTING : Plot Command, Formating & Labelling a plot, Multiple Plots, Adding Legend, Sub plots, Plotting a Fucntion, 2D & 3D Plots, Plot Editor.

UNIT – III

PROGRAMMING IN MATLAB : MATLAB Editor, Introducing to M files, Debugging M files , control flow ("if…end" structure, "for" loop, "while" loop etc.), Programming Examples.

UNIT – IV

SYSTEM MODELING USING SIMULINK : Simulation Steps, Getting Simulink , Creating & Simulating a Simulink Model, Storing/ Saving Data, Linking M file with Model File, Creating & making subsystems, Simulink Model to generate SINE, COSINE, WAVEFORM & RAMP SIGNAL.

UNIT – V

SIMULATION OF VARIOUS ELECTRIC CIRCUITS : Analysis of electrical Network, Experiment based on solutions of series parallel circuit, Experiment based on Solution of System with Linear Equation, Experiment Based on Mesh & Nodal Analysis, Experiment for Validation of Network Theorems, Experiment for Study of transients.

References-

1. "Modeling & Simulation Using MATLAB Simulink 2011" – DR. Shailendra Jain, Willey India.

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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

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