Ujjain Engineering College, Ujjain (MP) 456010

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

(EC/EE Branches :: July 2019)

Subject Code	Subject Name	Semester	Periods per Week			Scheme of Examination			Total Marks	Credits
			L	T	P	ESE	MST	QAR		
MA 3003	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.

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 3003	3	3	1	2	1	-	-	-	-	-	-	-

Policy for Attendance:

Attendance in lectures and tutorials is compulsory. Please ensure that your attendance is marked on the attendance sheet, and that this is done no later than the first five minutes of the class. There will be maximum 5% marks for attendance which will be awarded as follows:

Attendance	Marks	Attendance	Marks
$\leq$ 40%	1.0	61% $\leq$ 80%	3.5
41% $\leq$ 60%	2.5	81% $\leq$ 100%	5.0

Evaluation Plan:

1. There will be two assignments. Each assignment will carry 1% weightage. Dates, timings and syllabus for Assignment 1 and Assignment 2 will be announced later in the class.

2. There will be two quizzes. Quizzes will be conducted in the tutorial class. Each quiz will be of 30 minutes duration and will carry 1.5% weightage. Dates, timings and syllabus for Quiz 1 and Quiz 2 will be announced later in the class. Questions in Quiz 1 and Quiz 2 will be asked from the tutorial sheets. Missed quizzes cannot be made up.

3. The Mid-Semester examination, will be of 20% weightage. The syllabus for Mid-Sem examination will be announced later in the class. Questions in MSTs may be asked from the tutorial sheets. The End Semester Examination will be of 70% weightage, and will cover all the topics.

BE III SEMESTER						
COURSE CONTENTS						
EE 3301	**Signals & Systems**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration in hrs.		3	1	0	70	22

Course Objective:

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, Fourier Transform and properties, Parseval's theorem, Frequency response of LTI systems. Sampling Theorem.

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: Laplace Transform and 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)

EE3001

S&S

EE3301

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

CO1	Classify systems based on their properties and determine the response of LTI system using convolution.
CO2	Analyze the continuous time periodic and aperiodic signals using fourier analysis.
CO3	Obtain Discrete-Time Fourier series and Discrete-Time Fourier Transform of discrete signals.
CO4	Apply the Laplace transform &Z-transform for analysis of continuous and discrete time signals and systems.
CO5	Understand the process of sampling.

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

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

BE III SEMESTER						
COURSE CONTENTS						
EE3302	**Electrical Measurement**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration in hrs.		3	1	2	70	22

UNIT – I :

Measurement and error, accuracy and precision sensitivity resolution, effect of temperature, internal friction, stray field, hysterisis and frequency variation and method of minimizing them, loading effects, due to shunt connected and series connected instruments, calibration curve, testing & calibration of instruments.

Galvanometer - Theory and operation of ballistic galvanometer, D'arsonal galvanometer, galvanometer motion & damping, sensitivity. Definition of analog & digital instruments, classification of analog instruments, their operating principle, operating force, types of supports, damping, controlling, measuring instruments.

UNIT – II :

Measuring Instruments-PMMC, MI, Electrodynamometer, Hot wire, Electrostatic, Induction, Rectifier, 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 measurement of power in 3-ø circuit – one, two and three wattmeter method, measurement of reactive power by single wattmeter, single phase induction type energy meter – construction, operation, driving and braking torques, errors & compensations, testing by phantom loading and using R.S.S. meter, 3- phase energy meter, Tri – vector meter, maximum demand meter, ampere hour meter.

UNIT – III :

Instrument Transformer -Potential and current transformer, ratio & phase angle errors, testing of instruments transformer, difference between CT and PT, errors and reduction of errors.

UNIT – IV :

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

UNIT – V :

(a) B-H curve, Hysterisis loop determination specific losses in sheet metal–Lyod fischer square for measurement of power loss.

(b) Potentiometer – DC potentiometer standardisation–lap type Crompton's potentiometer application of DC potentiometer, AC polar type and coordinate type potentiometer, their construction and applications.

References-

1. Elect. measurement and measuring instruments-EW Golding and FC Widdis, Vedition, Wheeler publishing
2. Electrical and Electronics measurement and Instrumentation - A.K. Sawhney – Dhanpat Rai & Sons publications.
3. Electrical measurements - Buckingham and price, prentice hall.

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

EE3302

EE – 3002 Electrical Measurements

Course Outcomes

At the end of the course the students will be able to,

CO1	Apply the knowledge of static and dynamic characteristics of measuring instruments and explain the working principle of different types of galvanometers
CO2	Select the appropriate instruments for the measurement of various electrical parameters like voltage, current, power, phase, etc.
CO3	Compare the working of instrument transformers and analyse the different errors in them
CO4	Formulate different methods for measuring basic electrical circuit elements
CO5	Explain methods of measurement of magnetic circuit components and compare different types of null type instruments

Course Articulation Matrix:

Course	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE-3002.1	CO1	2	1	1	1	1	0	0	0	1	1	0	2
EE-3002.2	CO2	2	2	2	2	1	0	0	0	1	1	0	2
EE-3002.3	CO3	2	2	1	2	1	0	0	0	1	1	0	2
EE-3002.4	CO4	2	2	2	2	1	0	0	0	1	1	0	2
EE-3002.5	CO5	2	2	1	2	1	0	0	0	1	1	0	2
Average		**2**	**1.8**	**1.4**	**1.8**	**1**	**0**	**0**	**0**	**1**	**1**	**0**	**2**

BE III SEMESTER						
COURSE CONTENTS						
EE3303	**Circuit Theory**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration in hrs.		3	1	2	70	22

UNIT – I :

Introduction to circuit elements, voltage and current source and their transformation, duality of network, Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Milliman's theorem, Maximum power transfer theorem, Compensation theorem, Tellegen's theorem.

UNIT – II :

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

UNIT – III :

Coupled Circuits – self and mutual inductance, Coefficient of coupling, modelling of coupled circuits, Dot convention tuned coupled circuit. Concept of reflected impedance.

UNIT – IV :

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

UNIT – V :

Polyphase Circuits – 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 and power factor of a balanced 3- phase load, unbalanced loads.

References-

1. Sudhakar & 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

EE 3003 Ckt theory

EE 3303

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

CO1	Solve electrical network using network theorems.
CO2	Apply Laplace Transformation in electric circuit analysis.
CO3	Analyze the transient response of R-L, R-C, & R-L-C circuits.
CO4	do modelling of coupled circuits .
CO5	Understand the concept of resonance and Q-factor.
CO6	Analyze three phase circuits.

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

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

List of Experiment

1. To Verify Thevenin Theorem.
2. To Verify Superposition Theorem.
3. To Verify Reciprocity Theorem.
4. To Verify Maximum Power Transfer Theorem.
5. To Verify Millman's Theorem.
6. Measurement of power in 3 - phase circuit.
7. To Find Frequency Response of RLC Series Circuit.
8. To Find Frequency Response of RLC parallel Circuit.

BE III SEMESTER						
COURSE CONTENTS						
EE3304	**Electronic Devices & Circuits**	**L**	**T**	**P**	**Max. Marks**	**Min. Marks**
Duration in hrs.		3	1	2	70	22

Course Objective:

UNIT – I :
Transistor – BJT, 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, instrumentation amplifier, log and antilog amplifier, voltage to current and current to voltage converters, comparators, scmitt 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.

Text Books:
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.

EE3304

COURSE 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.

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

CO	Statement	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
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 amplifier and their frequency response adder subtractor differential amplifier, integrator and differential frequency response).
11 Study of Op-Amp as a comparator
12 Design of Schmitt trigger
13 Design of monoastable & astable multivibrator