

BECE203L	Circuit Theory	L	T	P	C
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Pre-requisite	BEEE101L, BEEE101P	Syllabus version			
		1.0			
Course Objectives					
<ol style="list-style-type: none"> 1. To prepare the students to analyse the given electrical network using phasors and graph theory. 2. To introduce the students with the basic knowledge of Laplace transform, Fourier Transform and Fourier series and to analyse the network using suitable technique. 3. To prepare the students to analyse the two-port networks, passive filters, and attenuators. 					
Course Outcome					
<ol style="list-style-type: none"> 1. Apply the knowledge of various circuit analysis techniques such as mesh analysis, nodal analysis, and network theorems to investigate the given network. 2. Analyse the resonance and transient response of the first order, second order circuits 3. Able to solve the networks using graphical approach. 4. Design and analyse two-port networks, passive filters and attenuators. 5. Able to analyse the given network by transforming from time domain to S domain. 6. Analyse the given network using Fourier series and transforming from time domain to frequency domain. 					
Module:1	Sinusoidal Steady-State Analysis	10 hours			
Review of steady state sinusoidal analysis using phasors. Node voltage and Mesh current analysis, special cases. Network theorems: Superposition, Thevenin, Norton and maximum power transfer theorems.					
Module:2	Transient Response of first order, second order circuits and Resonance	10 hours			
Time response in inductance (L) and capacitance (C), steady state response of circuits with RLC components. Response (forced & natural) of first order circuits (RL & RC): series, parallel, source free, complex circuits with more than one resistance, power sources and switches. Response of second order circuit (RLC): series, parallel and complex circuits. Series and parallel resonance condition.					
Module:3	Network Graphs	6 hours			
Definition of terms. Matrices associated with graphs: incidence, reduced incidence, fundamental cut-set and fundamental tie-set.					
Module:4	Two-Port Networks	8 hours			
Significance and applications of one port and two port networks. Two port network analysis using Admittance (Y) parameters, Impedance (Z) parameters and Hybrid (h) parameters. Interconnection of Two port networks					
Module:5	Filters, Attenuators and equalizers	8 hours			
Concept of filtering. Filter types: Low-pass, High-pass, Band-pass and Band-stop and their characteristics. Design of attenuators: T, π , Lattice and Bridged-T types, Equalizers.					
Module:6	Circuit Analysis in the S domain	8 hours			
Introduction to Laplace transform (LT), poles, zeros and transfer functions. Analysis of first and second order circuits subjected to periodic and aperiodic excitations using Laplace transforms.					
Module:7	Application of Fourier series and Fourier transforms in Circuit Analysis	8 hours			
Trigonometric Fourier series, Symmetry conditions, Applications in circuit solving, Fourier transforms. Properties, Applications in circuit solving, Comparisons of Fourier and Laplace transforms.					

Module:8	Contemporary Issues	2 hours	
		Total Lecture hours:	60 hours
Text Book(s)			
1.	Charles K. Alexander, Matthew N. O. Sadiku, "Fundamentals of Electric Circuits," 2020, Seventh Edition, McGraw Hill Higher Education.		
Reference Books			
1.	W.H.Hayt, J.E.Kemmerly & S.M.Durbin, "Engineering Circuit Analysis", 2019, Ninth Edition, McGraw Hill Higher Education.		
2.	Allan R. Hambley, "Electrical Engineering – Principles & applications", 2016, Sixth Edition, Pearson Education, Noida, India.		
Mode of Evaluation: Internal Assessment (CAT, Quizzes, Digital Assignments) & Final Assessment Test (FAT)			
Recommended by Board of Studies		09-11-2021	
Approved by Academic Council		No. 64	Date 16-12-2021