	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology in Electronics and Communication Engineering**	Year of Regulation	**2018-19**
Department	**Electronics and Communication Engineering**	Semester	**III**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 205	**Network Analysis and Synthesis**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To understand the fundamentals of electrical circuits		CO1	Able to acquire the knowledge about the fundamentals of electrical circuits
	To understand the concepts of network theorems and resonant circuits		CO2	Able to analyse and solve problems on network theorems and resonant circuits
	To analyse the two port network and network topology		CO3	Able to analyse and solve problems on two port network and network topology
	To understand the concepts of network synthesis and Laplace transformation		CO4	Able to analyse and solve problems on network synthesis and Laplace transformation

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
2	CO2	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
3	CO3	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
4	CO4	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**
5	CO5	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**1**	**-**

No.	Content	Hours	COs
I	***Introduction to electrical circuits:*** Electrical Circuit and Network: Concept and Terminology, Classification of electrical networks, R-L-C Parameters, Voltage and current sources, Independent and dependent sources, Source transformation, Voltage-current relationship for passive elements, Kirchhoff's laws, Network reduction techniques-Series, Parallel, Series-parallel, Star to Delta transformation, Nodal and Mesh analysis. Concept of Self and Mutual inductance, Co-efficient of coupling, Dot convention and loop analysis.	**4**	**CO1, CO2**
II	**Network theorems:** Statement and proof: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Millman's theorem, Reciprocity theorem, Tellegen's theorem under the dependent and independent sources for DC and AC excitation. **Resonance in AC circuits:** Characteristics and properties of resonance circuits, Series and parallel resonance circuits, Selectivity, Bandwidth and Quality factor.	**12**	**CO1, CO2**
III	**Two port networks:** Limitations Z, Y, ABCD, h-parameters, Conversion of one parameter to another parameter, Condition for reciprocity and symmetry, Two port network connections in series, parallel and cascaded. **Network topology:** Concept of Tree, Branch, Tree link, Incidence matrix, Tie-set matrix and Loop currents, Cut-set matrix and node pair potentials, Duality and Dual networks.	**6**	**CO3**
IV	**Network Synthesis:** Synthesis vs. analysis, Elements of circuit synthesis, LL FPB networks, Purpose and scope of network synthesis. **Positive Real Functions:** Definition, Necessary and sufficient conditions for a function to be positive real, Testing of driving point functions for positive realness. **FOSTER and CAUER Forms:** Foster and cauer forms of LC Networks, Synthesis of RC and RL networks.	**8**	**CO4**
V	**Laplace transform and Transient analysis:** Advantages of Laplace transform method, Definition and basic theorems of Laplace transform, Laplace transform of some basic functions and periodic functions, Inverse Laplace transform Transient response of R-L, R-C, R-L-C networks using Laplace transform method with DC and AC excitation. Response to step, Impulse and ramp inputs.	**4**	**CO4**
	Total Hours	**34**	

Essential Readings

1. Valkenberg, "Network Analysis", Prentice-Hall of India Pvt. Ltd, 3rd Edition, 2014.
2. F. F. Kuo, "Network Analysis and Synthesis", John Wiley & Sons, 2nd Edition, 2006.
3. C. L. Wadhwa, "Network Analysis and Synthesis", New Age International Publishers, 2nd Edition, 2007.

Supplementary Readings

1. D. R. Choudhary, "Networks and Systems", New Age International, 2nd Edition, , 2013.
2. A. Chakrabarti, "Circuit Theory: Analysis and Synthesis", Dhanpat Rai & Co., 6th Edition, 2014.
3. D. E. Scott, "An Introduction to Circuit analysis: A System Approach", 1st Edition McGraw Hill, 1987.