# Velammal College of Engineering and Technology(Autonomous) , Madurai – 625 009
## Department of Electronics and Communication Engineering
### 2023-2024 EVEN SEMESTER
## COURSE PLAN

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| **Degree** | **B.E-ECE** |
| **Course Code-Title** | **21EC102-Circuit Analysis** |
| **Batch** | **2023-2027** |
| **Year/Semester/section** | **I/II/A** |
| **Course Component** | **Professional core** |
| **Name of the Instructor** | **Dr.K.KAVITHA** |

| Session No | Topic to be covered | Application/ Examples | Text/Reference Book Page No. | Mode of Delivery | Teaching Aid | No. of Hours | Cumulative No. of Hours |
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| **UNIT –I DC CIRCUITS ANALYSIS** | | | | | | | |
| 1. | Introduction – Network terminology | | T1(9-20) | **L+D** | BB | 1 | 1 |
| 2. | Basic Components of Electric Circuits | | T1(25-45) | **L+D** | BB | 1 | 2 |
| 3. | Charge, Current, Voltage and Power, Voltage and Current Sources | | T1(87-96) | **L+D** | BB | 1 | 3 |
| 4. | Ohm's Law – Kirchoff's laws | | T1(94-127) | **L+ D** | BB | 1 | 4 |
| 5. | The single Node – Pair Circuit, Series and Parallel Connected Independent Sources | | T1(28-189) | **L+D** | BB | 2 | 6 |
| 6. | Resistors in Series and Parallel, Voltage and Current Division | | T1(21-43) | **L+D** | BB | 2 | 8 |
| 7. | Mesh current method of analysis for D.C circuits | Simulation using SPICE tool | T1(80-87) | **L+I,T** | BB | 3 | 11 |
| 8. | Node voltage method of analysis for D.C circuits | | T1(69-79) | **L+I,T** | BB | 2 | 13 |
| **UNIT II NETWORK THEOREM FOR DC CIRCUITS AND DUALITY** | | | | | | | |
| 9. | Network Theorems – Linearity and Superposition theorem | | T1(127-141), T1(339-342), R1(114-117) | **L+I,T** | BB | 2 | 15 |
| 10. | Thevenin's Theorem | | T1(144-145), T1(342-343), R1(117-119) | **L+I,T** | BB | 2 | 17 |

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| 11. | Norton's Theorem | Wheatstone bridge | T1(145-146), T1(342-343), R1(119-120) | **L+I,T** | BB | 2 | 19 |
| 12. | Maximum power transfer theorem | | T1(151-153) R1(123-125) | **L+I,T** | BB | 1 | 20 |
| 13. | Delta-Wye Conversion | | T1(164-166) R1(110-113) | **L+I, PS(Tx)** | BB | 2 | 22 |
| 14. | Duality and dual circuits | | T1(125-129) | **L+I** | BB | 1 | 23 |
| 15. | Analysis using dependent current sources and voltage sources. | Source modeling | R1(151-156) | **L+I** | BB | 2 | 25 |
| **UNIT- III SINUSOIDAL STEADY STATE ANALYSIS** | | | | | | | |
| 16. | Sinusoidal Steady – State analysis, Characteristics of Sinusoids | | T1(78-128) | **L+D** | BB | 2 | 27 |
| 17. | Nodal Analysis, Circuit Analysis techniques - Linearity and superposition | | T1(125-167) | **L+D,T** | BB | 2 | 29 |
| 18. | Mesh Analysis, Circuit Analysis techniques - Linearity and superposition | | T1(167-189) | **L+D,T** | BB | 2 | 31 |
| 19. | Thevenin and Norton Equivalent Circuits | | T1(189-195) | **L+D** | BB | 2 | 33 |
| 20. | Maximum Power Transfer - AC Circuit Power Analysis | | T1(200-216) | **L+D** | BB | 1 | 34 |
| 21. | Instantaneous Power, Average Power | | T1(216-279) | **L+D** | BB | 1 | 35 |
| | **UNIT- IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS** | | | | | | |
| 22. | Basic RL and RC Circuits | | T1(243-248) | **L+D** | BB | 1 | 36 |
| 23. | The Source- Free RL Circuit | | T1(243 | **L+I,T** | BB | 1 | 37 |
| 24. | The Source-Free RC Circuit | | T1(243 | **L+I,T** | BB | 1 | 38 |
| 25. | The Unit-Step Function-Driven RL Circuits | | T1(238-243) T1(248-251) R1(489-495) | **L+I** | BB | 1 | 39 |
| 26. | The Unit-Step Function-Driven RL Circuits, Driven RC Circuits | | | **L+I** | BB | 1 | 40 |
| 27. | The Unit-Step Function- RLC Circuits | | R1(495-497) | **L+ D,T** | BB | 1 | 41 |
| 28. | Frequency Response | | T1(552-562), R1(296-306) | **L+D,T** | BB | 1 | 42 |

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| 29. | Parallel Resonance | | T1(540-542), R1(317-323) | **L+D** | BB | 1 | 43 |
| 30. | Series Resonance | Radio | R1(304-312) | **L+D** | BB,LCD | 1 | 44 |
| 31. | Quality Factor | | T1(543-550), R1(309-314) | **L+D** | BB,LCD | 1 | 45 |
| **UNIT V – COUPLED CIRCUITS AND TOPOLOGY** | | | | | | | |
| 32. | Magnetically Coupled Circuits, Mutual Inductance | | T1(421-422,430-431) R1(438-444) | **L+D, TPS** | BB | 3 | 48 |
| 33. | Linear Transformer, Ideal Transformer | | R1(447-460) | **L+D** | BB | 1 | 49 |
| 34. | An introduction to Network Topology | | T1(425-428) | **L+I,T** | BB | 2 | 51 |
| 35. | Trees and General Nodal analysis | Graph theory | R1(51-67) | **L+ D** | BB | 2 | 53 |
| 36. | Links and Loop analysis | | R1(68-81) | **L+D,T** | BB | 2 | 55 |
| 37. | Revision | | | | | 2 | 57 |

**Total No. of hours: 57**

**ASSIGNMENT:**

1. Problems on Mesh Analysis
2. Problems on Nodal Analysis
3. Problems on Theorems
4. Problems-Transient analysis
5. Problems-Coupled Circuits

**TEXT BOOKS**

T1: Hayt Jack Kemmerly and Steven Durbin, "Engineering Circuit Analysis", 9th Edition, Mc Graw Hill, 2018.

**REFERENCES**

R1:Sudhakar A and Shyam Mohan SP, “Circuits and Networks Analysis and Synthesis”, Tata McGrawHill, 4th Edition

**Course In-charge** **Course Coordinator** **Module Coordinator** **HOD/ECE**