# ***Lesson Plan***

***Faculty: Sushma Nagdeote***

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| CLASS | SE Electronics, Semester III |
| Academic Term | July – Nov 2019 |
| Subject | **Electrical Network Analysis and Synthesis ( ELX 304)** |

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| ***Periods (Hours) per week*** | ***Lecture*** | ***4*** |
| | ***Practical*** | ***4*2=8*** |
| | ***Tutorial*** | ***--*** |

| ***Evaluation System*** | | ***Hours*** | ***Marks*** |
|---|---|---|---|
| | Theory examination | 3 | 80 |
| | Internal Assessment | -- | 20 |
| | Practical Examination | -- | -- |
| | Oral Examination | -- | -- |
| | Term work | -- | 25 |
| | Total | -- | 125 |

| ***Time Table*** | ***Day*** | ***Time*** |
|---|---|---|
| | Monday | 9.45 – 10.45 am |
| | Wednesday | 11.00 – 12.00 pm |
| | Thursday | 2.30 – 3.30 pm |
| | Friday | 12.00 – 01.00 pm |

## *Course Content and Lesson plan*

***Module 1&2: Analysis of DC Circuits, Analysis of AC Circuits***

| **Week** | **Lecture No.** | **Date** | | **Topic** | **Remarks(If any)** |
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| | | **Planned** | **Actual** | | |
| 1 | 1. | 01 – 07 – 19 | | Introduction To Cos and POS<br>Basics Of DC circuits | |

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|---|---|---|---|---|---|
| | 2. | 02 – 07 – 19 | | Source Transformation, Source Shifting | Declared holiday Due to rains |
| | 3. | 04 – 07 – 19 | | Examples for Practice | |
| | 4. | 05 – 07 – 19 | | Analysis of circuits with and without controlled sources using generalized loop | |
| 2 | 5. | 08 – 07 – 19 | | Analysis of circuits with and without controlled sources using generalized loop | |
| | 6. | 09 – 07 -19 | | Analysis of A.C circuits with independent circuit using generalized loop | |
| | 7. | 11 – 07 -19 | | Analysis of A.C circuits with independent circuit using generalized loop | |
| | 8. | 12 – 07 -19 | | Examples for Practice | |
| 3 | 9. | 15 – 07 -19 | | Analysis of circuits with and without controlled sources using Node matrix | |
| | 10. | 17 – 07 -19 | | Analysis of circuits with and without controlled sources using Node matrix (Super Node) | |
| | 11. | 18 – 07 -19 | | Analysis of A.C circuits with independent circuit using Node Matrix | |
| | 12. | 19– 07 -19 | | Superposition Theorem | |
| 4 | 13. | 22 – 07 -19 | | Examples For Practice | |
| | 14. | 24 – 07 -19 | | Superposition Theorem (A.C) | |
| | 15. | 25 – 07 -19 | | Thevenin's Theorem | |
| | 16. | 26 – 07 -19 | | Thevenin's Theorem (A.C) | |
| 5 | 17 | 29 – 07 -19 | | Examples For Practice | |
| | 18 | 31 – 07 -19 | | Norton's Theorem (Both) | |
| | 19 | 01 – 08 -19 | | Millman theorems (Both) | |
| | 20. | 02 – 08 -19 | | Examples For Practice | |
| 6 | 21. | 05 – 08 -19 | | Self and mutual inductance, coefficient of coupling, Dot convention | |
| | 22. | 07 – 08 -19 | | Equivalent circuit, solution using loop analysis | |
| | 23. | 08 – 08 -19 | | Equivalent circuit, solution using loop analysis | |
| | 24. | 09– 08 -19 | | Examples For Practice | |
| ***Module 3: Time and Frequency domain Analysis of Electrical Networks*** | | | | | |
| 7 | 25. | 12 – 08 -19 | | **Time domain analysis of R-L and R-C circuits**: Forced and natural response, time constant, initial and final values | |
| | | 14 – 08 -19 | | | Test 1 |

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| | | 15 – 08 -19 | | | Independence Day |
| | | 16 – 08 -19 | | | Test 1 |
| 8 | 26. | 19 -08-19 | | Transient and steady state time response, solution using universal formula of (R-L) (R-C) Circuits. | |
| | 27. | 21 -08 -19 | | Transient and steady state time response, solution using universal formula of (R-L) (R-C) Circuits. | |
| | 28. | 22-08 -19 | | Examples for Practice | |
| | 29. | 23-08 -19 | | Transient and steady state time response, solution using universal formula of R-L-C Circuits. | |
| 9 | 30. | 26 -08 -19 | | Transient and steady state time response, solution using universal formula of R-L-C Circuits | |
| | 31. | 28 -08 -19 | | S-domain representation, applications of Laplace Transform in solving electrical networks | |
| | 32. | 29 -08-19 | | S-domain representation, applications of Laplace Transform in solving electrical networks | |
| | 33. | 30 – 08 -19 | | Calculation of residues by analytical and graphical method, frequency response | |
| ***Module 4: Two Port Networks*** | | | | | |
| 10 | | 02 – 09 -19 | | | Mid Term Break |
| | | 04– 09 -19 | | | |
| | | 05– 09 -19 | | | |
| | | 06– 09 -19 | | | |
| 11 | 34. | 09– 09 -19 | | Driving point and transfer function, Poles and Zeros, | |
| | 35. | 11– 09 -19 | | Driving point and transfer function, Poles and Zeros, | |
| | 36. | 12– 09 -19 | | Ladder Network | |
| | 37. | 13 – 09 -19 | | Open Circuit, Short Circuit Parameters | |
| 12 | 38. | 16– 09 -19 | | Transmission and Hybrid parameters | |
| | 39. | 18– 09 -19 | | Relationships among parameters, reciprocity and symmetry conditions | |
| | 40. | 19 – 09 -19 | | T and Pi representations, interconnection of Two-Port networks | |
| | 41. | 20 – 09 -19 | | T and Pi representations, interconnection of Two-Port networks | |

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| ***Module 5: Synthesis Of RLC Circuits*** | | | | | |
| 13 | 42. | 23 – 09 -19 | | Examples for Practice | |
| | 43. | 25– 09 -19 | | Concept of positive real function, testing for Hurwitz polynomials | |
| | 44. | 26 – 09 -19 | | Examples for Practice | |
| | 45. | 27– 09 -19 | | Testing for necessary and sufficient conditions for positive real functions | CRMD |
| 14 | 46. | 30 – 09 -19 | | Synthesis of RC circuits | |
| | | 02– 10 -19 | | | Gandhi Jayanti |
| | 47. | 03– 10 -19 | | Synthesis of RL circuits | |
| | 48. | 04– 10 -19 | | Synthesis of LC circuits | |
| ***Module 6: Filters*** | | | | | |
| 15 | 49. | 07– 10 -19 | | Basic filter circuits | |
| | 50. | 09– 10 -19 | | Basic filter circuits | |
| | 51. | 10– 10 -19 | | Concept of design and analysis of filters | |
| | 52. | 11– 10 -19 | | Solving University Questions | |
| 16 | | 14– 10 -19 | | | Test 2 |
| | | 16– 10 -19 | | | Test 2 |
| | | 17– 10 -19 | | | Test 2 |
| | | 18– 10 -19 | | | Term End |

**Text Books:**


1. *Circuits and Networks: Analysis and Synthesis,* A. Sudhakar and S.P. Shyammohan, Tata McGraw-Hill Publishing Company Ltd.
2. *Engineering Circuit Analysis*, William Hayt and Jack Kemmerly, McGraw-Hill.


**Reference Books:**


1. *Networks and Systems*, D.Roy Choudhury, New Age International Publications.
2. *Network Analysis and Synthesis*, Franklin F. Kuo, Wiley.
3. *Network Analysis*, M.E.VanValkenburg, 3/E, PHI.
4. *Shaum's Outline of Theory and Problems of Basic Circuit Analysis*, John O'Malley, McGraw-Hill.


**Internal Assessment (IA):**

Two tests must be conducted which should cover at least 80% of syllabus. The average marks of both the tests will be considered as final IA marks.

**Term Work:**

At least 5 experiments covering entire syllabus of ELX 305 (Electronic Instruments and Measurements) should be set to have well predefined inference and conclusion and minimum of five tutorials covering entire syllabus of ELX304 (Electrical Network Analysis and Synthesis) with each tutorial shall have a minimum of four numerical problems solved and duly assessed. Simulation based tutorials shall be based using any circuit simulation tool like Spice/LTspice are encouraged. The final certification and acceptance of term work ensures satisfactory performance of laboratory work and minimum passing marks in term work.

**End Semester Examination:**

- Question paper will comprise of 6 questions, each carrying 20 marks.
- The students need to solve total 4 questions.
- Question No. 1 will be compulsory and based on the entire syllabus.
- Remaining questions (Question No. 2 to 6) will be set from all the modules.
- Weightage of each module in question paper will be proportional to the number of respective lecture hours mentioned in the syllabus.

| **Submitted By** | **Approved By** |
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| | |
| Prof. Sushma Nagdeote | ii) Prof. K. Narayanan Sign: |
| | |
| Sign: | ii) Prof. SapnaPrabhu Sign: |
| | |
| | iii) Prof. ShilpaPatil Sign: |
| | iv) Prof. Monica Khanore Sign: |
| | |
| **Date of Submission:** | **Date of Approval:16/07/2019** |
| | |
| **Remarks by PAC (if any)** | |
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