DMT 112/3
CIRCUIT THEORY I

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Class

• **Lecture**
  Monday, BKQ2, 11\text{am} – 1\text{pm}
  Wednesday, BKQ1, 8\text{am} – 9\text{am}

• **Lab**
  Tuesday, MMDP
  1(a) : 3\text{pm} – 5\text{pm}
  1(b) : 5\text{pm} – 7\text{pm}
Evaluation

• Final examination 50%

• Course Work 50%

  - Mid Semester Test 10%
  - End Semester Test 10%
  - Lab Report 10%
  - Lab Test 10%
  - Assignment/Quiz 10%
Course Outcomes

**CO1**
Ability to identify the basic circuit elements, calculate and solve a circuit using Ohm’s Law.
Course Outcomes

CO2

Ability to identify, calculate and solve a circuit using method of circuit analysis and network theorem in DC electric circuit.
Course Outcomes

CO3

Ability to identify, define and calculate the capacitance, inductance, initial and steady state condition in RL and RC circuit
Chapter 1: Basic Circuit Theory

- Overview of circuit analysis
- SI units, voltage and currents, power, energy.
- Resistance and colour coding, elements on the circuit (passive and active) voltage and current source.
- Ohm’s Law and power calculation with passive sign calculation.
- Nodes, Branches and Loops
Syllabus

Chapter 2 : Resistive Circuit

• Series /Parallel circuits
• Kirchhoff`s voltage law (KVL) and voltage divider rule.
• Kirchoff`s current law (KCL) and current divider rule.
• Delta to Wye Conversion ,Wye to Delta Conversion
Syllabus

Chapter 3: Methods of Circuit Analysis

• Nodal analysis, Nodal analysis with dependence sources and voltage sources.
• Mesh analysis, Mesh analysis with dependence sources and with current sources.
Chapter 4 : Network Theorem

- Superposition theorem
- Sources Transformation
- Thevenin’s theorem, Norton theorem, and Maximum power transfer
Chapter 5: Capacitor and Inductor

- Capacitors, relationships between voltage, current and energy for capacitor, Series and parallel capacitance.
- Inductor, relationships between voltage, current and energy for inductor, series and parallel inductance.
Chapter 6: First Order Circuit

- Natural Response of RL circuit and RC circuit.
- Step Response of RL circuit and RC circuit.
Lab sessions

1) Lab Module 0: Introduction to basic laboratory equipment.
2) Lab Module 1: Series/Parallel resistor and verification of Kirchhoff`s Laws.
3) Lab Module 2: Nodal Analysis
4) Lab Module 3: Mesh Analysis
5) Lab Module 4: Thevenin`s Theorem and Maximum Power Transfer
References

TEXT BOOK:
Fundamental of Electric Circuit
References


RULES

• Attendance;
• > 90%
• Warning letter will be given if absence for 3 times. 2 warning letters -> bar from examination
• Excuses only if with Surat Pengecualian/MC
• Assignment/Lab Submission **MUST BE ON TIME.**
## Dates to be AWARE!!!

<table>
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<tr>
<th>Activities</th>
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<td>Mid semester examination</td>
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<td>Laboratory Test</td>
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112 Gbit/s signals encoded on each mode are arbitrarily routed through the circuits consisting of many sharp bends and compact crossings with a bit error rate under forward error correction limit. This will significantly improve the integration density and benefit various on-chip multimode optical systems. The spectrally efficient DMT technique allows us to achieve 112 Gbit/s single lane rate under a bandwidth-constrained condition. The constellations with a bit index of 5 (32-QAM) and 4 (16 Analytic precision calculations for the observables in renormalizable quantum field theories have developed during the last 70 years significantly. These methods have helped to put the Standard Model of elementary particles to tests of an unprecedented accuracy, requested by the scientific method [1]. Present and future high luminosity experiments [2,3] will demand even higher precision predictions at the theory side. This goes along with mastering large sets of analytic data by methods of computer algebra and special mathematical methods to perform the corresponding integrals analytically. In the realm of dynamic circuits, linear circuit theory has a much greater foothold. In the DC domain, a nonlinear system is explained by nonlinear algebraic equations which can be solved graphically or by numerical methods. For dynamic circuits, coupled nonlinear differential equations must be solved. Linear systems theory predicts a stable oscillation (assuming nonzero initial conditions) if the system characteristic equation gives a pair of complex conjugate poles lying on the imaginary axis. For this condition to occur, the damping term must be exactly zero and the constant b positive. This design is not robust or practical since any deviation from the first requirement results in an instability or a decaying oscillation.