**Prelab-5 Worksheet**

**Circuit Analysis – I**

|  |  |
| --- | --- |
| Student Name(s): |  |
| Student ID(s): |  |

### **Task 1: Theoretical Calculations – Nodal Analysis**

Use nodal analysis to compute the nodal voltages of the circuit in Fig. 1. Show ‘**detailed step-by-step**’ calculations within the space provided below and record your answers in Table 1 of this worksheet.

|  |  |
| --- | --- |
|  | |
|  |  |
|  |  |
|  | |
|  | |
|  | |

**Table 1: Nodal Voltages of Complex DC Circuit**

|  |  |
| --- | --- |
| **Nodal Voltage Term** | **Nodal Voltage Value** |
|  |  |
|  |  |
|  |  |
|  |  |

### **Task 2: Theoretical Calculations – Mesh Analysis**

Use mesh analysis to compute the mesh currents of the circuit in Fig. 1. Show ‘**detailed step-by-step**’ calculations within the space provided below and record your answers in Table 2 of this worksheet.

|  |  |
| --- | --- |
|  |  |
|  |  |
|  | |
|  | |
|  | |

**Table 2: Mesh Currents of Complex DC Circuit**

|  |  |
| --- | --- |
| **Mesh Current Term** | **Mesh Current Value** |
|  |  |
|  |  |
|  |  |

## **Task 3:** Verify Analyses using LTspice Simulation

**Table 3: Nodal Voltages and Mesh Currents Obtained from LTspice Simulation of Complex DC Circuit**

|  |  |  |
| --- | --- | --- |
| **Circuit Variable Term** | **Nodal Voltage Value** | **Mesh Current Value** |
|  |  | N/A |
|  |  | N/A |
|  |  | N/A |
|  |  | N/A |
|  | N/A |  |
|  | N/A |  |
|  | N/A |  |

**Note:** You should note the time/labor savings of performing analysis using circuit simulations compared to hand calculations when you compare Task 3 to Tasks 1 and 2.

**Screenshot # 1: LTspice DC Operating Point Analysis of Complex DC Circuit (Fig. 1)** (Place your screenshot below)

**Prelab-5 Submission Requirements:**

* Convert/save this Prelab-5 Worksheet **as a .pdf file** with a filename as follows:

**If Prelab is done individually:** “Prelab-5\_FirstName\_LastName.pdf”.

**If Prelab is done in a group:** If you have been explicitly instructed by your lab instructor to perform the Prelab exercises in a group, then save this Prelab-5 Worksheet **as a .pdf file** with a filename following the convention below:

Let’s consider that two students are doing the prelab in a group. Then the filename should be: “Prelab-5\_FirstName of Student 1\_FirstName of Student 2.pdf”. For example, if name of the two students are Tom Cruz and Morgan Freeman, respectively, then the Prelab-5 Worksheet file should have the following name: “Prelab-5\_Tom\_Morgan.pdf”. Similar file naming convention should be followed to properly name your LTspice schematic file. Improperly named files may be subject to point deductions.

* **Prelab Submission Checklist:** There should be two files submitted for your Prelab-5 assignment. The Prelab-5 Worksheet (.pdf) and the LTspice schematic file (.asc).
* Check with your lab instructor about specific instructions on how to submit your Prelab files for assessment and grading.

**Prelab Score:** This prelab contributes to 30 points toward Lab 5 (each Task in the Prelab is worth 10 points). In-lab hands-on work will contribute to 70 points (Lab 5 total is 100 points).