**American University of Science & Technology**

 **Department of Computer and Communications Engineering**

**CCE 301L: Electronics Laboratory**

 **Spring 2011-2012**

 **Midterm Exam**

April, 2012

 **Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID Number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**CLOSED BOOK (90 Minutes)**

**IT IS IMPORTANT THAT YOU READ AND UNDERSTAND THE FOLLOWING:**

**Questions are not allowed** during the examination. If you believe that there is ambiguity in a specific question, simply write your own assumptions and proceed with the answer.

The **CHEATING** penalty will result in an **F** in the course.

**Mobile Phones** are strictly prohibited in the examination hall.

**Programmable Calculators** are not allowed in this exam.

**Borrowing** of any material is not permissible.

Write your **Name** and **ID Number** in the indicated space of the question booklet.

You may use the back of any page of for **scratch** or for your **answers**.

**Do not detach** any sheet from the question booklet.

This exam consists of **2 pages**. **Make sure that you have the correct number of pages**.

**THE WHOLE EXAM SHOULD BE MADE ON THIS QUESTION BOOKLET**

**ANY OTHER SUBMISSION IS NOT GOING TO BE GRADED**

**YOU NEED TO SHOW ALL OF YOUR WORK TO GET COMPLETE CREDIT.**

**Good Luck!**

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| --- | --- |
| **Problem**  | **Points** |
|  **1** |  **: 10** |
|  **2** |  **: 15** |
|  **3** |  **: 10** |
|  **4** |  **: 20** |
|  5 |  **: 10** |
|  **6** |  **: 10** |
|  **7** |  **: 10** |
|  **8** |  **: 05** |
|  **9** |  **: 10** |

 **SCORE /100**

**Question #1 (10 points)**

**Draw a circuit to measure the forward characteristic of a semiconductor diode. Indicate also how to measure the current and the voltage.**

**Question #2 (15 points)**

1. **State the difference between an ideal and a real transformer. (5 points)**
2. **Draw the equivalent circuit of a real transformer. How can you measure the impedance of a transformer. (10 points)**

**Question #3 (10 points)**

1. **Draw the circuit of an ac-dimmer with a resistive load (incandescent lamp). (5 points)**
2. **Suppose this load has to be supplied by a dc-voltage. How your new circuit will look like?**

**The dimmer remains the same but you have to change or to add a small circuit to the lamp.**

**( 5 points)**

**Question #4 (20 points)**

**Given a pure ac-sine wave voltage that supplies a full-wave rectifier bridge.**

1. **How can you measure the PIV of one diode (no calculation). Draw the wave form? (5 points)**
2. **Suppose that one diode is taken away (interruption of the current path) from the bridge. Draw the output voltage and find the PIV for the rest three diodes. (15 points)**

**Question #5 (10 points)**

1. **Design a dual power supply (+18 V…0…-18V) using Zener-diodes and feeding an op-amp with a maximum input current of 25 mA. (5 points)**
2. **State the value ( rate and maximum power) of all components, and the secondary voltage of the transformer.( 5 points)**

**Question #6 (10 points)**

**Design a power supply +6 V for a load with a maximum current of 25 mA without using a transformer.**

 **State the value of all components. You have to show all necessary calculation.**

**Question # 7 (10 points)**

**A transistor is switching an inductive-resistive to a dc-power supply. Draw a circuit to protect your device from overvoltage.**

**Question #8 (5 points)**

**Draw the equivalent circuit of an npn- and pnp-transistor and show how to troubleshoot them using a DVM?**

**Question #9 (10 points)**

1. **How can you measure the ripple voltage peak to peak from a filtered and rectified ac-voltage? ( 5 points)**
2. **The average voltage of a filtered dc-output is greater or less than the same rectified voltage without filter. Explain on hand the corresponding waveform. ( 5 points)**