American University of Science & Technology

**Department of Computer and Communications Engineering**

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**CCE 301: Electronics**

 **Spring Term 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 for **scratch** or for your **answers**.

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

This exam consists of **7 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** | **: 10** |
| **3** | **: 15** |
| **4** |  **: 20** |
| **5** |  **: 20** |
| **6** |  **: 10** |
| **7** |  **: 15** |

 **SCORE: /100**

**Question #1 (10 points)**

a.Find IB, IE, and Ic in the following fig. αDC= 0.975. (5 points)

b. Find VE, VCB, and VCE. (5 points)

 

**Question #2 (10 points)**

1. Find VCE, and VBC. βDC= 55. (5 points)
2. Determine whether or not the transistor is saturated. ( 5 points)

 

**Question #3 (15 points)**

1. **Determine Ic(sat)for the transistor. (3 points)**
2. **What is the value of IB necessary to produce saturation ? (6 points)**
3. **What minimum value of VB is necessary for saturation ? (6 points)**

**βDC = 150. Assume VCE = 0.1 V**

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**Question # 4 (20 points)**

**Draw the output voltage of the following circuits and indicate the peak value for each wave. Vin= 15Vsinωt for all circuits**

1. **4 points Vout**

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1. **4 points**

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1. **4 points**

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1. **4 points**

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1. **4 points**

 

**Question #5 (20 points)**

 **Given PD= 1 W, Izk= 0.5 mA, and Vz=12 V at Iz = 25 mA, Zz= 10 Ω for a Zener–diode in the following circuit. The resistive load R out is variable and can have any value.**

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1. **Find the value of Rin that should be used. State the value of Rout in this case. (10 points)**
2. **Find the minimum value of Rout where the Zener-diode is still regulating the voltage.** **(10 points)**

**Question #6**

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1. Try to explain in few words the function of this circuit. (5 points)
2. State or imagine two applications for this circuit. Explain briefly. (5 points)

Remark: Q3 and Q2 is the same photo-transistor.

**Question #7 (15 points)**

**Following transistor circuit is given:**

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1. **Find the value of Vcc(max) if VCE(max)= 18 V. PD= 600 mW. (10 points)**
2. **What happen to the transistor if VBB= 0 V by taking into consideration item a. (5** points)