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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2020/201 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**DIPLOMA IN INFORMATION TECHNOLOGY**

**COURSE CODE: DIT 028**

**COURSE TITLE: DIGITAL ELECTRONICS**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 19/08/2021 TIME: 12.00-2.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) questions**
* **Use sketch diagrams to illustrate your answer whenever necessary**
* **Do not carry mobile phones or any other written materials in examination room**
* **Do not write on this paper**

**This paper consists of FOUR (4) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Define
2. intrinsic and
3. extrinsic semiconductors. (4marks)
4. Explain the following terms: (3marks)
5. Conductor
6. Insulator
7. Semiconductor
8. Highlight six characteristics of semiconductors. (6marks)
9. Briefly describe how you can obtain a P-N junction using a well-illustrated diagram. (5marks)
10. What is doping (2marks)
11. Draw the p-n junction diode symbols for both forward and reverse bias. (5marks)

**QUESTION 2**

1. Define the term transistor. (2marks)
2. A common emitter transistor has a reverse leakage current, ICBO =48Na and a gain α= 0.992.
3. Find β and ICEO (4marks)
4. Find its exact collector current when IB =30µA. (4marks)
5. Find the approximate collector current neglecting leakage current. (2marks)
6. State the three types of transistor static characteristics. (3marks)

**QUESTION 3**

1. Work out as indicated in brackets.

* (1001.0101)2 (**Binary –to- decimal conversion)** (3marks)
* (1E0.2A)16 (**Hexadecimal – to – decimal conversion** (4marks)

1. State any two (2) advantages of digital systems. (2marks)
2. Convert the following binary number to its decimal equivalent. (3marks)

(1001.0101)

1. Express the following binary number into their 2’s complement. (3marks)

10010110

**QUESTION 4**

1. What do you understand by the term;
2. ‘Quiescent point’
3. Logic gate (3marks)
4. State the four transistor biasing methods. (4marks)
5. Compute the two’s complement of the following binary numbers.

* 10010110 (4marks)
* 10001001 (4marks)

**QUESTION 5:**

1. Complete the truth tables below for the basic operators indicated. (6marks)

**AND**

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **R** |
| 0 | 0 |  |
| 0 | 1 |  |
| 1 | 0 |  |
| 1 | 1 |  |

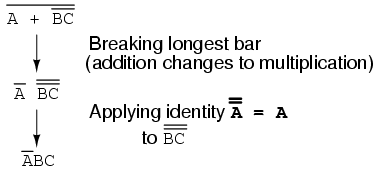
OR +

|  |  |  |
| --- | --- | --- |
| A | B | R |
| 0 | 0 |  |
|  | 1 | 1 |
| 1 | 0 |  |
| 1 |  | 1 |

NOT ‘

|  |  |
| --- | --- |
| A | R |
|  | 1 |
| 1 |  |

1. Simplify the following Boolean expression using DeMorgans’ theorem (5marks)



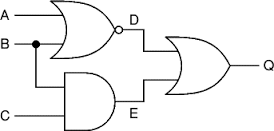
1. Represent the simplified expression in a circuit diagram. (4marks)

**QUESTION 6:**

1. Convert the following binary number to their hexadecimal equivalents. (3marks)

1001.1111

1. Perform the following binary operations (6marks)
2. 00010011 + 00111110
3. 00110011 – 00010110
4. 00101001 x 00000110
5. Provide logical expressions **D**, **E** &**Q** for the arrangement below. (6marks)

[](https://www.google.com/imgres?imgurl=http://boncoeur.be/logic_gates/gates1.gif&imgrefurl=http://boncoeur.be/logic_gates.html&docid=YjZf26AFAjKe2M&tbnid=Ng8qqZXgOjmyfM:&w=343&h=164&client=firefox-a&bih=624&biw=980&ved=0ahUKEwi4tNS8lNnNAhXLVRQKHerCCZgQMwhlKCgwKA&iact=mrc&uact=8)