CSI104: Foundations Of Computer Science

**Duration: 90’**

**Lab 1:**

**Objective**:

* Describe the decimal, binary, hexadecimal, and octal system.
* Convert a number in binary, octal, or hexadecimal to a number in the decimal system.
* Convert a number in the decimal system to a number in binary, octal, and hexadecimal.
* Convert a number in binary to octal and vice versa.

**Materials:**

Based on exercises of chapter 2 in the textbook “Foundations Of Computer Science, 4nd Edition, Behrouz Forouzan, 2017.”

**Student's task:**

* Review the whole chapter 2 content in the textbook.
* Write down solutions to exercises (step by step)
* Finish exercises and submit the results to the lecturer in class.

**Scoring scale: 10**

**Exercise 1** **(2.5 marks): Convert decimal numbers to binary ones**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Decimal** | **4-bit Binary** | **Decimal** | **8-bit Binary** | **Decimal** | **16-bit Binary** |
| 9 | 1001 | 7 |  | 255 |  |
| 7 |  | 34 |  | 192 |  |
| 2 |  | 125 |  | 188 |  |
| 15 |  | 157 |  | 312 |  |
| 12 |  | 162 |  | 517 |  |
| 11 |  | 37 |  | 264 |  |
| 6 |  | 66 |  | 543 |  |
| 5 |  | 77 |  | 819 |  |
| 8 |  | 88 |  | 1027 |  |
| 13 |  | 99 |  | 2055 |  |
| 14 |  | 109 |  | 63 |  |

**Exercise 2 (2.5marks): Convert decimal numbers to binary and hexadecimal ones**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Decimal** | **Binary** | **Hexa.** | **Decimal** | **16-bit Binary** | **Hexadecimal** |
| 9 | 1001 | 9 | 255 | 0000 0000 1111 1111 | 00FF |
| 127 | 0111 1111 | 9F | 192 |  |  |
| 125 |  |  | 188 |  |  |
| 157 |  |  | 312 |  |  |
| 162 |  |  | 517 |  |  |
| 37 |  |  | 264 |  |  |
| 66 |  |  | 543 |  |  |
| 77 |  |  | 819 |  |  |
| 88 |  |  | 1027 |  |  |
| 99 |  |  | 2055 |  |  |
| 109 |  |  | 63 |  |  |

**Exercise 3 (2.5 marks): Compute** (b: binary, q: octal, h: hexadecimal)

**3245q + 247q = ?q = ?b**

**1A7Bh + 26FE7h = ?h = ?b**

**1101101101b - 10110111b =?b**

**3654q – 337q =?q = ?b**

**3AB7h – 1FAh = ?h = ?b**

**36Ah – 576q = ?h = ?b**

**64AEh – 1001101b= ?q**

101101111b

+ 100111011b

110110001b

110001101b

1011010b\* 1011b

1101000b + 2ABh + 345q = ?h = ?q

3AFh / 1Ch =?b = ?d

3ACh – 562q = ?b = ?d

3FFAh / 327q = ?b = ?d

**Exercise 4 (2.5 marks)**

1. Show binary formats of 1-byte unsigned numbers: 251, 163, 117
2. Show binary formats of 2-byte unsigned numbers: 551, 160, 443
3. Show binary formats of 1-byte signed numbers: -51, -163, -117, 320
4. Show the decimal values of 1-byte unsigned representations: :

01100011b, 10001111b, 11001010b, 01001100b