**Subject: PRF192- PFC**

**Workshop 01**

**Objectives:**

1. Reviewing for number systems
2. Exploring memory of a C program

**Recommendations**

Part 1: Students do exercises using notebooks

Part 2: Students develop programs, run them, write down their memory structure to notebooks.

**Part 1: Number systems**

**Exercise 1** **(2 marks): Convert decimal numbers to binary ones**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Decimal** | **4-bit Binary** | **Decimal** | **8-bit Binary** | **Decimal** | **16-bit Binary** |
| 9 | 1001 | 7 | 0000 0111 | 255 | 0000 0000 1111 1111 |
| 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 marks): 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 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**

101101111 b

+ 100111011 b

110110001 b

110001101b

1011010 b\* 1011b

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

3AFh / 1Ch =? b = ?d

3ACh – 562q = ?b = ? d

3FFA h / 327q = ?b = ? d

**Exercise 4 (2 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, -20
4. Show the decimal values of 1-byte unsigned representations: :

01100011 b , 10001111 b , 11001010 b , 01001100 b

**Part 2: Explore memory structure of programs**

**Sample**

**Complete the code of following program then draw it’s memory structure**

**(2 marks)**

