**SECOND YEAR EXAMINATION FOR THE AWARD OF DEGREE IN COMPUTER SCIENCE**

**COMP 202: ASSEMBLY LANGUAGE PROGRAMMING**

**STREAM:** **TIME:** 2 HOUR

**Instructions**

* **Question 1 is compulsory**
* **Answer any other two questions.**
* **Extra answered questions will not be marked.**
* **Show all your workings where applicable**

**Question 1 (30 Marks)**

1. Giving suitable example, distinguish between RISC and CISC microprocessor

[3 Marks]

1. Using a suitable diagram, explain the fetch execute cycle as applied in MIPS microprocessors.

[8 Marks]

1. Write down the binary representation of the decimal number, assuming the IEEE 754 single precision format.
   1. 63.25
   2. 146987.40625

[6 Marks]

1. Write the MIPS code for the following C++ language expression
   1. a = b + c; d = a – e;

[4 Marks]

* 1. f = (g + h) – (i + j);

[4 Marks]

* 1. g = h + A[8];

[5 Marks]

**Question 2 (20 Marks)**

The following problems explore translating from C++ to MIPS. Assume that the variables f, g, h, and i are given and could be considered 32-bit integers as declared in a C program.

i.) f = g – h;

ii.) f = g + (h - 5);

1. For the C++ statements above, what is the corresponding MIPS assembly code? Use a minimal number of MIPS assembly instructions.

[5 Marks}]

1. For the C++ statements above, how many MIPS assembly instructions are needed to perform the C statement?

[2 Marks]

1. If the variables f, g, h, and i have values 1, 2, 3, and 4, respectively, what is the end value of f?

[3 Marks]

1. Write a MIPS program that would take an integer value N from the command line and print the sum of 1 to N.

[10 Marks]

**Question 3 (20 Marks)**

The following problems deal with translating from C++ to MIPS. Assume that the variables f, g, h, i, and j are assigned to registers $s0, $s1, $s2, $s3, and $s4, respectively. Assume that the base address of the arrays A and B are in registers $s6 and $s7, respectively.

i). f = –g – A[4];

ii). B[8] = A[i–j];

1. For the C++ statements above, what is the corresponding MIPS assembly code? Use a minimal number of MIPS assembly instructions

[6 Marks]

1. For the C++ statements above, how many MIPS assembly instructions are needed to perform the C statement?

[3 Marks]

1. For the C++ statements above, how many different registers are needed to carry out the C++ statement?

[3 Marks]

1. Write a MIPS program that would take a Statement from command prompt and then print out each character of in the statement.

[8 Marks]

**Question 4 (20 Marks)**

1. Explain the following terms with respect to programming
2. Algorithm

[2 Marks]

1. Pseudo Code

[2 Marks]

1. Source code

[2 Marks]

1. A simple program for calculating the total and the mean integer values and which is terminated by a value 0. You are required to
2. write an algorithm for the program

[3 Marks]

1. Write a working MIPS 32 assembly source for program.

[11 Marks]

**Question 5 (20 Marks)**

1. Explain the following terms as used in programming
   1. Subroutine

[2 Marks]

* 1. Function

[2 Marks]

* 1. Procedure

[2 Marks]

1. Convert to assembly

void stcpy(char x[], char[]){

int i;

i=0;

while ((x[i]=y[i]) != `\0`)

i+=1;

}

[5 Marks]

1. Write a MIPS assembly-language subroutine having the following requirements. The subroutine takes two arguments, in $a0 and $a1, which hold the base memory addresses of two equal-sized arrays, and a third argument in $a2 that holds the arrays’ lengths. The subroutine’s function is to copy the contents of the first array into the second array but in reverse order. This subroutine also must preserve the values of all the caller’s registers

[9 Marks]

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