

NAME _____ STUDENT ID _____

**Class Examination in
EG2068 ELECTRONICS AND MICROPROCESSORS
Friday 3rd December 1999 4 pm - 5 pm**

Candidates should attempt ALL questions. The paper has a total of 20 Marks.

1. a) In approximately which year did the first electronic computers appear? [1 mark]
1920-1930; 1930-1940; 1940-1950; 1950-1960; 1960-1970

- b) What is the name of the CPU register which stores the address of the next instruction?
_____ [1 mark]
- c) Which part of the CPU is responsible for fetching and decoding instructions?
_____ [1 mark]
2. a) Describe the operation of taking the one's complement of a 16 bit number, by finding the value of ~ 4 when stored as a 2 byte word. Write your answer in **hexadecimal**.

Description:

_____ [2 marks]
- b) Provide the 16-bit 2's complement (in **binary**) of the following decimal numbers:
- (i) +10
_____ [2 marks]
- (ii) +32767.
_____ [2 marks]
- c) What is the result (in hexadecimal) of adding the decimal value 50 to the Hexadecimal value 0x051E?

Working:

Answer: _____ [1 mark]

d) A computer executes the following program:

```
101:  ADD r0, 0x0F
102:  MOV r1, 0xF0
103:  OR r1, r0
104:  AND r0, r1
```

(i) Given the Program Counter (PC) has a value of 102, after executing an instruction. Which is the next instruction to be fetched?

_____ [1 mark]

(ii) If the initial value of r0 is 0x07, what is the **hexadecimal** value **after** executing all the listed instructions?

_____ [2 marks]

3. a) Given register r1 has the value 0x01, and the memory location 0 has the value 0x06, what is the **hexadecimal** value in register r1 after executing each of the following instructions:

(i) MOV r1, #0

_____ [1 mark]

(ii) XOR r1, r1

_____ [1 mark]

(iii) MOV r1, 0

_____ [1 mark]

b) Consider the following **binary** number: 1000000000000000

(i) when this is interpreted as a **decimal** unsigned 2 byte word

_____ [1 mark]

(ii) when this contains a **hexadecimal** 1's complement number

_____ [1 mark]

(iii) when this contains a **decimal** 2's complement number

_____ [1 mark]

c) The following small program consists of two instructions. What is the **hexadecimal** value in register r0 after executing **each** of the two instructions:

a: 0x50 ; first value

b: 0x20 ; second value

MOV r0,a

_____ [1 mark]

SHFT.R r0,4

_____ [1 mark]