



UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION
JANUARY 2016 SEMESTER

COURSE CODE : LEB 40503

COURSE NAME : MICROPROCESSOR

PROGRAMME NAME : BACHELOR OF ENGINEERING TECHNOLOGY (HONS)
(FOR MPU: PROGRAMME LEVEL) IN MARINE ELECTRICAL & ELECTRONIC

DATE : 25TH MAY 2016

TIME : 9.00 AM – 12.00 NOON

DURATION : 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please **CAREFULLY** read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. Answer **FOUR (4)** questions **ONLY**.
4. Please write your answers on the answer booklet provided.
5. Answer should be written in blue or black ink except for sketching, graphic and illustration.
6. Answer all questions in English language **ONLY**.

THERE ARE 4 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

**INSTRUCTION: Answer only FOUR questions.
Please use the answer booklet provided.**

Question 1

- (a) Solve the equation $@3(\$9F \div 5) - (42 \div \$8)$ using radix minus two method. Present your final answer in hexadecimal number. (*Show your calculation method*). CLO1
(10 marks)

- (b) Examine the content of data register and the status of condition code register after executing each of the following instructions in sequence. CLO2

```
MOVEQ    #$AB, D0
MULU    #2, D0
EXT.WD0
ADD.L   #$87, D0
```

Assume that the 68000 is in the supervisor state.

(8 marks)

- (c) Write a program to calculate the number $10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1$ into D1 using loop. What will be the value of the D1 in the end of execution? CLO3
(7 marks)

Question 2

(a) Solve the equation $\$6(73_{10} - 105_{10}) + \BC in binary number. Present your final answer in decimal number. (*Show your calculation method*). CLO1 (10 marks)

(b) Explain the process of transition data from 8-bits designs up to 16-bits designs provided by the 68000. CLO2

(7 marks)

(c) Write a program to find an average of an array as given below:- CLO3

```

                ORG        $3000
ARRAY1        DC.W        5, 6, 7, 11, 32, 52, 4, 3
SUM           DS.W        1
                END

```

(8 marks)

Question 3

(a) Solve the equation $(62_8 \div A_{16}) \times 2.5_{10} - 32_{16}$ in binary number. Present your answer in decimal number. (*Show your calculation method*).

(10 marks)

(b) Analyze the procedure taken by 68000 in handling bus error occasion. CLO2

(8 marks)

(c) Write a program that will clear the lower byte of D1 if the lower word D0 contains zero, otherwise fill D1 with the value of -1. Then save the value of D1 into the address of \$2000. CLO3

(7 marks)

Question 4

- (a) 16k-words of EPROM with a starting address of \$60 0000 and 512k-words of RAM with base address of \$70 0000 need to be interfaced to a 68k-based system. Design the decoder circuit. **CLO1** (10 marks)
- (b) Analyze the procedures for handling system bus to bus master. **CLO2** (7 marks)
- (c) Create a subroutine that will convert the temperature from Celsius to Fahrenheit. The formula for the conversion is given below. **CLO3**

$$F = C \left(\frac{9}{5} \right) + 32$$

(8 marks)

Question 5

- (a) Design an address decoder for 1 Mbytes of ROM using 256k × 8 bit chips with starting address at \$00 000. **CLO** (10 marks)
- (b) Explain the sequence of events for the write cycle in 68000. **CLO2** (8 marks)
- (c) Create a subroutine to solve the following quadratic equation where the word value for x is stored in D0 and the result of the equation (y) is returned in the lower word of D1. **CLO3**

$$y = 5x^2 - 8x + 13$$

(7 marks)

END OF QUESTIONS

