Universiti Tun Hussein Onn Malaysia

# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER I
## SESSION 2014/2015

| | | |
|---|---|---|
| COURSE NAME | : | ELECTRONICS TECHNOLOGY AND MICROPROCESSING |
| COURSE CODE | : | BNJ 30302 |
| PROGRAMME | : | 3BNL |
| EXAMINATION DATE | : | DECEMBER 2014/JANUARY 2015 |
| DURATION | : | 2 HOURS 30 MINUTES |
| INSTRUCTION | : | ANSWER **ALL** QUESTIONS |

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

**Q1** (a) Discuss the differences among insulator, conductor and semiconductor.

(6 marks)

(b) *pn* junction is a basic part in creating a diode . Explain the process of creating a *pn* junction from *p-type* semiconductor and *n-type* semiconductor.

(8 marks)

(c) Briefly explain the following semiconductor terms.

(i) *Forward-bias*
(ii) *Reverse-bias*
(iii) *Depletion region*

(6 marks)

**Q2** (a) Briefly explain any **TWO** (**2**) of the following diode models.

(i) *Simplified diode model*
(ii) *Constant voltage drop model*
(iii) *Zener diode model*

(6 marks)

(b) Analyse the bridge rectifier in the diagram in the Figure **Q2**(**b**) and construct a waveform based on the diagram.

(8 marks)

(c) Briefly explain the usage of a transistor.

(6 marks)

**Q3** (a) Condition codes register (CCR) contains **FIVE** (**5**) status bits that may be directly tested by the programmer.

(i) List out all status bits in CCR and explain briefly for each bit.

(5 marks)

(ii) If status register contains $24A8, what is the state of each condition code?

(1 marks)

(b) Explain the operation of the following instructions and give a suitable for each example.

(i) MOVE.W D0, D2
(ii) MOVE.L (A0),D0

(4 marks)

(c) Determine the value of CCR after executing the following instructions. Given D0=$FFFFFFFF, D1 = $0000807F and status register CCR is XNZVC = 11111. All instructions are independent.

(i) ADD.L #1,D0
(ii) SUB.B #$7F,D1
(iii) MULS D0,D1
(iv) ROXL.B #2,D1
(v) MOVE.W D7,D3

(10 marks)

**Q4** (a) Analyse the program below and determine the value of the following memory content.

```
CODE    EQU     $1000
DATA    EQU     $2000

        ORG     CODE

PROG    MOVE.W  NUMBERS,D0
        ADD.W   NUMBERS+2,D0
        ADD.W   NUMBERS+4,D0
        MOVE.W  D0,SUM

        ORG     DATA

        NUMBERS
        DC.W    $2222
        DC.W    $3333
        DC.W    $4444
        DC.W    0
SUM     DC.W    0
        END
```

(i) $2000
(ii) $2001
(iii) $2002
(iv) $2003
(v) $2004
(vi) $2005
(vii) $2006
(viii) $2007
(viiii) $2008
(x) $2009

(10 marks)

(b) Determine the value of D0 and D1 after the execution of each instruction.

```
        MOVEQ   #-1,    D0
        MOVEQ   #4,     D1
MORE    ADDQ    #2,     D0
        SUBQ    #2,     D1
        BNE     MORE
```

(10 marks)

**Q5** (a) Analyze the program below and determine the contents of A0, D0, D1 and memory address of $2000, $2001, $2002, $2003 and $2004 every time the program reaches the instruction **NOP**.

```
START     MOVEA.L   #$2000,A0
          MOVE.L    #$2045FF11,(A0)+
          MOVE.B    #$08,(A0)+
          MOVE.B    -2(A0),D0
          MOVE.B    -4(A0),D1
          NOP

          CMP.B     D1,D0
          BGT       LABEL_1
          SUB.B     D0,-3(A0)
          ROL.B     #3,D0
          BMI       LABEL_3
          ADDI.B    #2,-5(A0)
          BRA       LABEL_7
LABEL_1   BCHG.B    #2,-3(A0)
LABEL_3   ADD.B     -1(A0),D0
          BSET.B    #2,$2000
LABEL_7   NOP
```

| | 1st NOP | 2nd NOP |
|---|---|---|
| A0 | $2005 | |
| D0 | | |
| D1 | | |
| Mem($2000) | | |
| Mem($2001) | | |
| Mem($2002) | | |
| Mem($2003) | 11 | |
| Mem($2004) | | |

(14 marks)

(b) Explain briefly any **THREE** (**3**) of the following addressing modes in Motorola 68000 programming:

(i) Data register direct
(ii) Address register direct
(iii) Address register indirect
(iv) Absolute short addressing
(v) Immediate data

(6 marks)

**– END OF QUESTION –**

**FINAL EXAMINATION**

SEMESTER/ SESSION : SEM I 2014/2015 PROGRAMME : BNL
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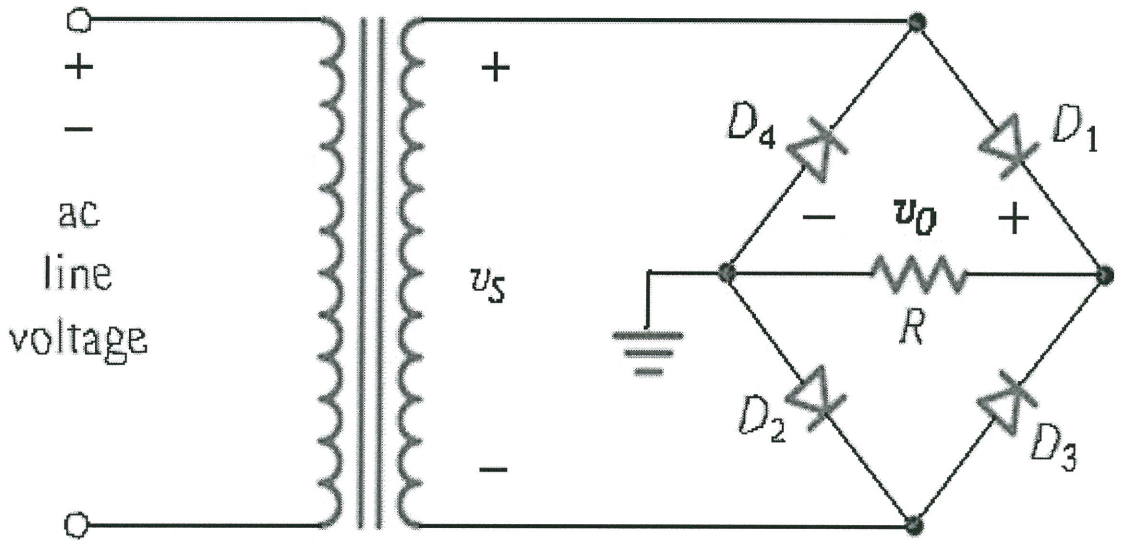


**Figure Q2(b)**