



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017**

TERBUKA

COURSE NAME : ELECTRICAL TECHNOLOGY AND
MICROPROCESSING

COURSE CODE : BNJ 30302

PROGRAMME : BNL

EXAMINATION DATE : DECEMBER 2016 / JANUARY 2017

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

Q1 (a) Differentiate semiconductors, conductors and insulators on the basis of band gap and illustrate the energy gap for each of them.

(6 marks)

(b) Briefly explain the donor and acceptor impurities.

(4 marks)

(c) Briefly explain the effect of forward bias and reverse bias on the depletion region.

(6 marks)

(d) Illustrate the following diode models:

- (i) Simplified Diode Model
- (ii) The Constant Voltage Diode Model

(4 marks)

Q2 (a) State and compare **TWO (2)** breakdown mechanisms for Diode.

(4 marks)

(b) Describe the following type of diodes and draw their symbols:

- (i) Light Emitting diode
- (ii) Zener diode
- (iii) Schottky diode
- (iv) Shockley diode

(8 marks)

(c) Briefly explain the differences between the Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET). Sketch the symbol for each of them.

(8 marks)

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- Q3** (a) A factory requires a robot arm to welding frame joints on an assembly line. Choose the most appropriate technology between microprocessor and microcontroller to handle the factory requirement. Justify your answer.
- (4 marks)
- (b) Briefly explain the size of the address register and data register on the Motorola 68000 microprocessor.
- (4 marks)
- (c) Describe the following terms:
- (i) Random Access Memory (RAM)
 - (ii) Read Only Memory (ROM)
- (4 marks)
- (d) Condition codes register (CCR) contains **FIVE (5)** status bits that may be directly tested by the programmer.
- (i) List out and describe all status bits in CCR.
- (5 marks)
- (ii) If status register contains \$24C4, identify the state of each condition code.
- (3 marks)

- Q4** (a) What is the advantage of using Harvard architecture compared to Von Neumann Architecture that has been used in microcontroller? Illustrate the block diagram of Harvard architecture.

(4 marks)

- (b) Explain briefly the relationship between PORTA registers and TRISA registers. What is the main difference between PORTA and PORTB registers for PIC16F84?

(4 marks)

- (c) Determine the contents of the file registers and working registers for each mnemonic in following codes:

```

MOVLW    0
MOVWF    0x20
INCF     0x20, W
INCF     0x20, W
INCF     0x20, F
INCF     0x20, F
INCF     0x20
INCF     0x20, W

```

(7 marks)

- (d) Identify and write a comment for each of the instructions in the program below.

```

reset      CLRF      06
start      BTFSS     05, 0
              GOTO      reset
              BTFSC     05, 01
              GOTO      start
              INCF     06
              MOVLW    OFF
              CALL      delay
              GOTO      start
              END

```

(5 marks)

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- Q5** (a) PIC16F84 is used to execute subroutine 1. If PIC clock input is 200 kHz, evaluate the total delay to execute the subroutine. (Initial C=0).

Subroutine1

```

MOVLW    30h
MOVWF    20h
MOVLW    .2
MOVWF    21h
MOVLW    .1
LOOP    RRF    20h
          SUBWF  21h
          BTFSS 03,2
          GOTO  LOOP
          RETURN

```

(5 marks)

- (b) Calculate the pre-load value required in TMR0 register to obtain a delay of 10 ms between the load operation and the TOIF going high, if the clock rate is 8 MHz and the value of PS2:PS1:PS0 in OPTION register are 4:2:4.

(3 marks)

- (c) RS232 is a standard which defines serial transfer of data from one point to another. **FIGURE Q5(c)** shows the pin designations of RS232. Briefly explain the function of each pin.

(9 marks)

- (d) Sketch the signal of character 'M' (M = 4Dh) in TD line of RS232 if the system used 8-bit data format with one start bit, one stop bit and used even parity as an error detection scheme. (Given start bit = '0', stop bit = '1')

(3 marks)

- END OF QUESTIONS -

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1. CD	<i>(Carrier Detect)</i>
2. RXD	<i>(Receive Data)</i>
3. TXD	<i>(Transmit Data)</i>
4. DTR	<i>(Data terminal Ready)</i>
5. GND	<i>(Ground)</i>
6. DSR	<i>(Data Set Ready)</i>
7. RTS	<i>(Request To Send)</i>
8. CTS	<i>(Clear To Send)</i>
9. RI	<i>(Ring Indicator)</i>

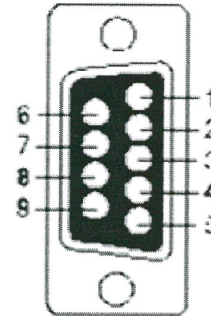


FIGURE Q5(c)