國立臺北科技大學

101學年度研究所碩士在職專班招生

電資碩士專班

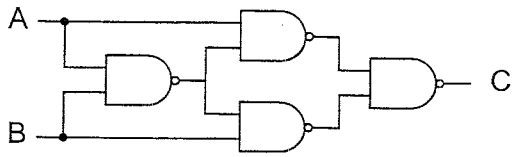
甲組：計算機概論試題

填准考證號碼

注意事項：

1. 本試題共【8】題，配分共100分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

1. Consider the circuit below:



(a) What is the logical expression of the circuit? (5%)

(b) Write down the truth table of the circuit. (5%)

2. Answer the following questions regarding data representation.

(a) What is the hexadecimal equivalent of the following bit patterns? (5%)
1010100111111111

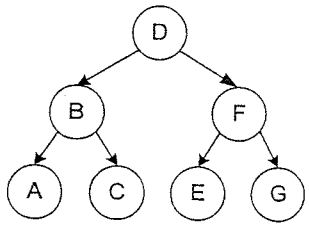
(b) What is the equivalent base ten representation of the following bit patterns using two's complement? (5%)
10111

(c) What is the equivalent base ten representation of the following bit patterns using excess-16? (5%)
01111

(d) Consider a floating point binary notation with 8 bits. From left to right, it consists of one bit for the sign (0 for positive sign; 1 for negative sign), three bits for the exponent represented in excess-4 notation, and the remaining bits for the decimal part of the mantissa. Decode the bit pattern 11111010 using this floating point format. (5%)

3. List all necessary conditions that lead to deadlock: (10%)

4. Given the following binary tree:



(a) Traverse the tree in **pre-order** and list the traversal sequence in terms of node letter. (5%)

(b) Traverse the tree in **in-order** and list the traversal sequence in terms of node letter. (5%)

(c) Traverse the tree in **post-order** and list the traversal sequence in terms of node letter. (5%)

5. According to the Internet Assigned Numbers Authority (IANA), what are the subnet masks of the following IPv4 address range reserved for private networks for the following RFC1918 block name?

(a) 24-bit block 10.0.0.0 – 1.255.255.255 (5%)

(b) 20-bit block 172.16.0.0 – 172.31.255.255 (5%)

(c) 16-bit block 192.168.0.0 – 192.168.255.255 (5%)

6. Answer the following Complexity Classes problems.

(a) Describe the complexity class **P.** (3 %)

(b) Describe the complexity class **NP.** (3 %)

(c) Describe **NP-Complete** problem. (4 %)

注意：背面尚有試題

7. The following table is the "language description table."

Op-code	Operand	Description
1	RXY	LOAD reg. R with the bit pattern from memory cell whose address is XY.
2	RXY	LOAD reg. R with the bit pattern XY.
3	RXY	STORE the bit pattern found in reg. R in the memory cell whose address is XY.
4	0RS	MOVE the bit pattern found in reg. R to reg. S.
5	RST	ADD (two's complement) reg. S and T and leave the result in reg. R.
6	RST	ADD (floating-point notation) reg. S and T and leave the result in reg. R.
7	RST	OR the bit patterns in reg. S and T and place the result in reg. R.
8	RST	AND the bit patterns in reg. S and T and place the result in reg. R.
9	RST	EXCLUSIVE OR the bit patterns in reg. S and T and place the result in reg. R.
A	R0X	ROTATE the bit pattern in reg. R one bit to the right X times.
B	RXY	JUMP to memory cell at address XY if reg. R is equal to reg. 0.
C	000	HALT execution.

The following codes are part of a machine's memory containing a program written in the language described in the "language description table". Answer the questions below (hexadecimal representation) assuming that the machine is started with its program counter containing 00.

address	content (hexadecimal representation)
00	24
01	03
02	20
03	F9
04	53
05	04
06	33
07	00
08	C0
09	00

(a) What bit pattern will be in register 4 when the machine halts? (2%)
(b) What bit pattern will be in register 0 when the machine halts? (2%)
(c) What bit pattern will be in register 3 when the machine halts? (2%)
(d) What bit pattern will be at memory location 00 when the machine halts? (2%)

8. Spell out the following common networking abbreviations fully.
Example: Wi-Fi = Wireless Fidelity
(a) HTTP (2%)
(b) TCP/IP (2%)
(c) WiMAX (2%)
(d) CSMA/CD (2%)
(e) FTP (2%)
(f) URL (2%)