

# 國立臺北科技大學

## 九十二學年度電機工程系碩士班入學考試

### 計算機概論試題

填准考證號碼

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第一頁 共二頁

#### 注意事項：

1. 本試題共【十二】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. (a) (2%) Explain the advantages of taking Excess-3 Binary Coded Decimal over ordinary Binary Coded Decimal to represent decimal digits.  
(b) (2%) Explain why we prefer to use Gray Code rather than Binary Code when making state assignment in a sequential machine designing process.  
(c) (2%) Explain why we choose 2's Complement instead of 1's Complement when dealing with negative numbers in arithmetic operations.  
(d) (2%) Explain why we choose Excess Code instead of 2's Complement when representing the exponential part of a floating number.
2. (8%) As we know, Residue Number System (RNS) is the typical representative of Un-weighted Number System. But the lack information of weightings is also the main drawback of RNS. Therefore, we should convert RNS's numbers into weighted numbers, e.g. decimal numbers, via Chinese Remainder Theory before comparing their magnitudes. Please convert, accompanying with your transformation process, the following two numbers A and B into decimal and then identify the bigger one.

	Modulo-5	Modulo-7	Modulo-11
A	3	4	2
B	1	6	2

3. (8%) Convert, accompanying with intermediate results which might include Truth table and Karnaugh maps, a D-Flip/Flop into a J-K Flip/Flop.

4. (8%) Refer to the program segments below and mark down the printout if the subroutine is (a) called-by-value, (b) called-by-address, (c) called-by-name, and (d) called-by-value-result.

**Program Test**

**Begin**

$a = 4$

$b = 7$

**Call Subroutine** ( $a+b, a, a$ )

**Print a**

**End**

**Subroutine**( $x, y, z$ )

**Begin**

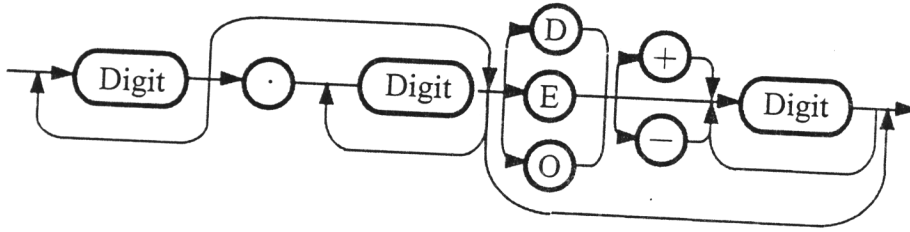
$y = y + 10$

$z = x + z$

**End**

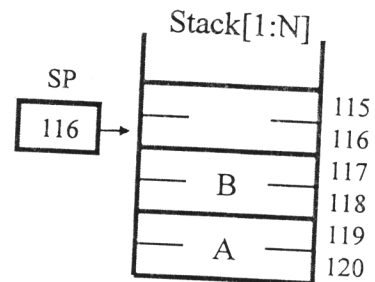
5. (5%) Refer to the syntax diagram below and identify those legal numbers :

- (a) 49.22O+08    (b) 5.E-16    (c) .6537    (d) -3.2145    (e) 1,234,567



6. (8%) A four dimensional array has been declared as  $\text{Array}[-3:2, -1:6, 2:7, 0:5]$ . Each of its elements occupies three memory spaces starting from  $(123)_{10}$  in ascending order. Find out the address of element  $\text{Array}(0,1,2,3)$  when Array is stored (a) in Column-Major order, and (b) in Row-Major order.

7. (8%) Refer to the memory allocation diagram of a stack with the capacity of N. Write down the basic algorithms for (a) PUSH C, and (b) POP D operations.



8. Refer to the expression below :

$$\sim A + -B \times C \div D + E < F \text{ AND } G - H$$

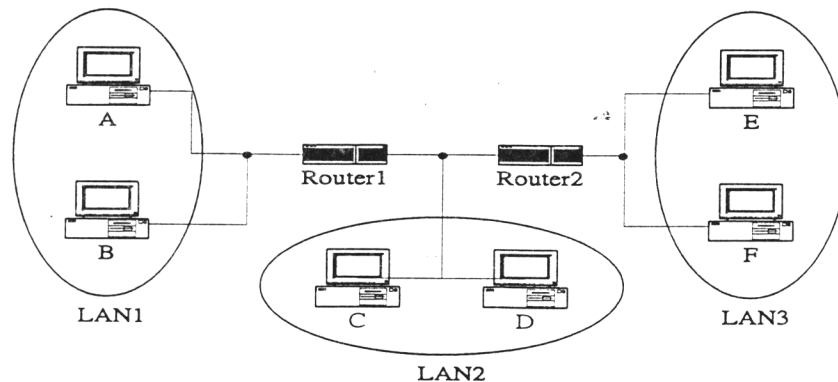
- (a) (4%) Draw its Binary Tree.
- (b) (3%) Translate it into Prefixed Expression.
- (c) (3%) Translate it into Postfixed Expression.

注意：背面尚有試題

9. (12%) Refer to the CPU's schedule chart and find out the average waiting time if it follows  
 (a) First-Come-First-Serve strategy, (b) Shortest-Job-First strategy, (c) Priority strategy,  
 and (d) Preemptive-Algorithm.

Job	Arrival Time	Burst Time	Priority
1	4	5	3
2	2	4	1
3	0	7	5
4	5	8	4
5	8	6	2

10. (a) (3%) Why do HTTP, FTP, SMTP, POP3, and IMAP run on the top of TCP rather than UDP?
- (b) (3%) Describe why Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why?
- (c) (3%) What are the differences between message confidentiality and message integrity? Can you have one without the other? Justify your answer.
11. Consider three LANs interconnected by two routers, as shown in the diagram below.
- (a) (3%) Assign IP addresses to all of the interfaces. For LAN1 use addresses of the form 111.111.111.xxx; for LAN 2 uses addresses of the form 122.222.222.xxx; and for LAN 3 use addresses of the form 133.333.333.xxx.
- (b) (3%) Assign LAN addresses to all of the adapters (Computers and Routers).



12. (10%) Write down in English the complete names of the following abbreviations :
- (a) CGI    (b) DNS    (c) EPROM    (d) FTP    (e) GPRS  
 (f) HTML    (g) IEEE    (h) JPEG    (i) MIPS    (j) WWW