

# 國立成功大學

## 114學年度碩士班招生考試試題

編 號： 118

系 所： 生物醫學工程學系

科 目： 計算機概論

日 期： 0210

節 次： 第 2 節

注 意： 1.不可使用計算機  
2.請於答案卷(卡)作答，於  
試題上作答，不予計分。

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (15%) A turning machine's transition table and the tape configuration as below. Please write the final configuration of the tape and list the process.

Transition table

Current State	Read	Write	Move	New State
A	b	b	R	B
B	1	#	R	B
B	b	b	L	C
C	#	1	L	C
C	b	b	R	B

*\* R means move right, and L means move left.*

...     $\downarrow$     b    1    1    1    b    ...

Tape configuration

2. (10%) Substitution ciphers don't always involve a one-to-one character mapping. The Polybius cipher encrypts each letter as two integers, using a character matrix as the key. The ciphertext consists of the row and column numbers of the plaintext letter in the matrix. Encipher "NCKU BME" using the Polybius cipher with the following key matrix.

	1	2	3	4	5
1	Z	space	D	W	O
2	G	C	E	Y	P
3	N	B	X	M	R
4	F	V	H	Q	S
5	T	A	K	L	U

3. (15%) Lossless Compression Methods are important in the biomedical field. Please **Encode** and **Decode** the message **BAABBBBAACAA** by
- (A) Huffman Encoding
- (B) Lempel Ziv Encoding

4. (15%) Briefly describe the following terms:
- Inheritance** and **Encapsulation** of OOP (Object-Oriented Programming)
  - Data-link Layer** of OSI (Open System Interconnection) model
  - Deadlock** and **Starvation** of Process Manager in OS (Operating System)
5. (15%) Using the **Bubble Sort**, **Selection Sort**, and **Insertion Sort** algorithms, manually sort the following list in descending order, showing the step-by-step process for each algorithm.  
**20, 1, 98, 25, 114, 16, 6**
6. (10%) Convert the following numbers without using a calculator, and show your work:
- $(F27.D)_{16}$  convert to octal number
  - $(110101.101)_2$  convert to octal number
  - $(12.3)_8$  convert to binary number
  - $(37.4)_8$  convert to decimal number
  - $(100111.01101)_2$  convert to hexadecimal number
7. (10%) The **Dijkstra method** is an algorithm for finding the shortest path from one vertex to all other vertices. Please describe the Dijkstra method and provide an example.  
(5%) If you want to use this algorithm for finding the optimal radiation plan in 3D medical imaging for tumor therapy, please describe the key considerations in your design.
8. (5%) Consider a **binary tree** with ten nodes. Its inorder and preorder traversals are as below. Please draw the binary tree.

**Preorder: JCBADefIGH**

**Inorder: ABCEDfJGIH**