國立成功大學75學年度電機工程研究所考試（計算機概論 試題） 共 2 頁 第 1 頁

1. Explain the following terms:
   (a) S-100 bus (b) IEEE-488 bus (c) Warshall's Algorithm
   (d) shell sort (e) Hub polling

2. A relation on a set S (and its corresponding diagraph and adjacency matrix) is transitive if for any three elements x, y, and z in S, if x is related to y and y is related to z then x is related to z
   (a) What must be true of a digraph if it represents a transitive relation
   (b) What must be true of the boolean product of the adjacency matrix of a transitive digraph with itself
   (c) Prove that the transitive closure of any digraph is transitive

3. How can you represent a polynomial in three variables (x, y & z) as a circular list? Each node should represent a term and should contain the powers of x, y and z as well as the coefficient of that term. Write pascal functions to do the following:
   (a) Add two such polynomials
   (b) Multiply two such polynomials.

4. A control unit has two inputs x and y and eight states. The control state diagram is shown in Fig.-1
   (a) Design the control using eight D flip-flops
   (b) Design the control using a register, a decoder and a PLA.

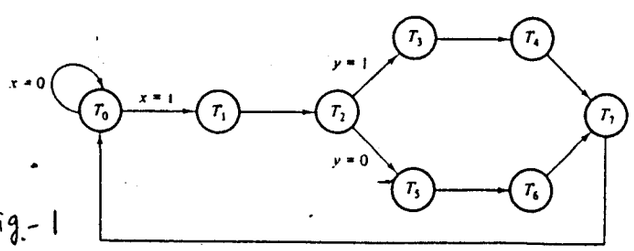

Fig.-1

二. A computer uses the shift register shown in Fig-2 to perform shift and rotate operations. Inputs to the control logic for this register consist of

ASR	Arithmetic Shift Right
LSR	Logic Shift Right
SL	Shift Left
ROR	Rotate Right
LD	parallel load

All shift and load operations are controlled by one clock input. The shift register is implemented by using D flip-flop. Give a complete logic diagram for the control logic and for bits r_0 r_1 and r_{15} of the shift register.

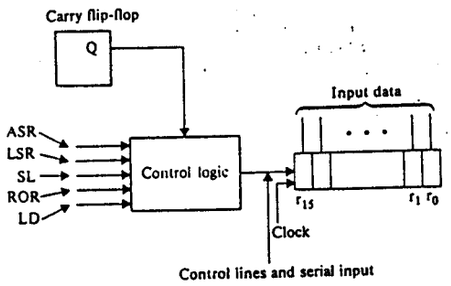

Fig-2