

1. (i) Convert the binary representation: 11.01 to its equivalent base ten form (3%)
and (ii) convert $5^5/8$ to binary form: (3%)

2. Perform the indicated operations: (6%)

10000011
AND 11101100

10000011
XOR 11101100

3. Convert the following pseudo code routine to an equivalent routine using a repeat -
until statement: (8%)

```
assign Z the value 0  
assign X the value 1  
while (X < 6) do  
    (assign Z the value Z + X;  
    assign X the value X + 1)
```

4. (i) What is "multitasking"? (4%)

(ii) Explain how multitasking operating systems can obtain higher throughput than
systems that insist on performing each task completely before starting the next. (6%)

5. Briefly explain each of the four stages (analysis, design, implementation, and testing)
within the development phase of the software life cycle. (10%)

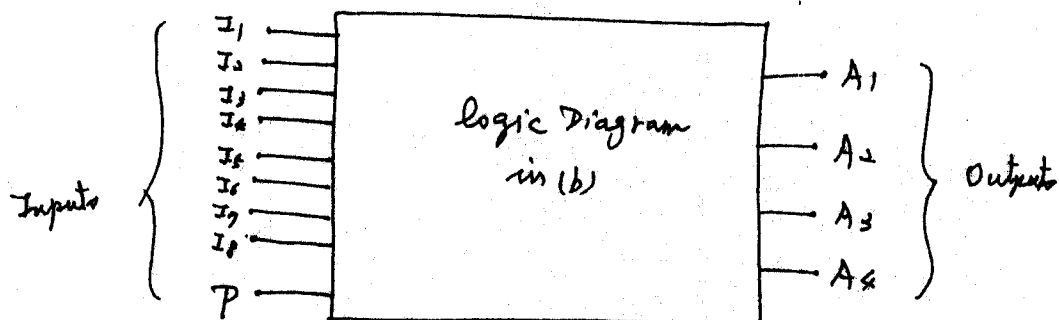
6. Draw a binary tree of the letters C, B, E, D, F, and A and draw an actual organization of
the binary tree using a linked structure. (10%)

(背面仍有題目,請繼續作答)

12. A microprocessor-based automation system continuously monitors eight logical inputs from an industrial robot. The eight inputs are received in parallel, one nibble (i.e., 4 bits) at a time, via a 4-bit register that is commanded by the microprocessor to alternate the register every half-second between inputs 1 through 4 and inputs 5 through 8. The microprocessor does this by outputting a logic variable (P), which takes on the value logic 1 when inputs 1-4 are to be received and logic 0 when inputs 5-8 are to be received. Designate the 4-bit input register as logic variables A_1 through A_4 (low order to high order) and the input variables as I_1 through I_8 (low order to high order).

- Write the Boolean logic expressions of variables A_1 through A_4 as functions of inputs I_1 through I_8 and P . (8 %)
- Draw a logic diagram that represents the parallel input system of this microprocessor. (7 %)
- When $P=1$, the input register reads hex C; when $P=0$, the input register reads hex 9. What inputs from the industrial robot are logic 1? (5 %)

[Hint: Please use AND gates, OR gates and NOT gates to draw the logic diagram in (b).]



7. Explain what are Ethernet, RS-232C Bus, RS-422 Bus, LAN, and EEPROM? (10%)
8. Explain what is DMA? and how it works? (5%)
9. Explain what is the 7-layer ISO/OSI reference model? (5%)
10. A certain microprocessor has ROM address hex 0000 to hex 9000 and RAM addresses hex 9001 to hex FFFF. What is the memory capacity of this microprocessor, and how much memory is allocated to ROM and to RAM, respectively? (5%)
11. A microprocessor is equipped with a parallel I/O interface device. How many pins are required for the transmission of data points of value up to hex FF? If the device had been a serial I/O arrangement, how many pins would have been required? (5%)

(背面仍有題目,請繼續作答)