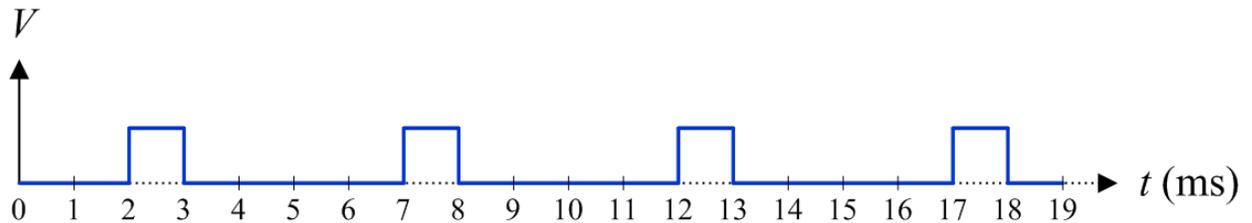
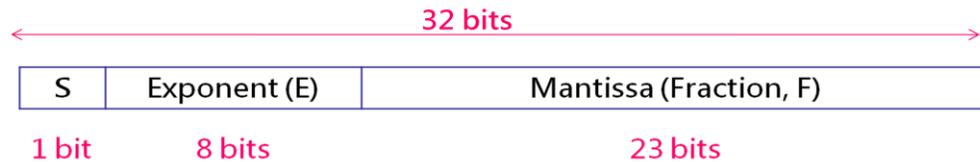


97 學年度 數位系統設計 (CS-204-B) 期中考考卷

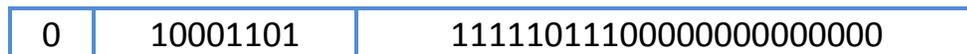
- (1) [12 pts.] Determine **the period (T)**, **the frequency (f)**, and **the duty cycle** of the following periodic digital waveform. (Note that $1\text{ms} = 1 \times 10^{-3}$ second.)



- (2) [8 pts.] Correct any error in each of the following Hamming codes with even parity.
 (a) 1110100
 (b) 1000111
- (3) [5 pts.] Convert the decimal number 5.37×10^3 to a single-precision floating-point binary number.



- (4) [5 pts.] Convert the following single-precision floating point binary number to decimal.



- (5) [2 pts.] Convert the Gray code 11000010001 to binary.
- (6) [2 pts.] Convert the BCD number 100001110000 to decimal.
- (7) [2 pts.] Convert the hexadecimal number $(8A9D)_{16}$ to binary.
- (8) [8 pts.] Express each of the following decimal numbers as an 8-bit number in the 2's complement form.
 (a) $(57)_{10}$ (b) $(-36)_{10}$
- (9) [4 pts.] Multiply 01101010 by 11110001 in the 2's complement form.

- (10) [2 pts.] Divide 01001 by 00011 in the 2's complement form.
- (11) [4 pts.] Perform the addition (01110000 + 10101111) in the 2's complement form.
- (12) [4 pts.] Perform the subtraction (01100101 - 11100111) in the 2's complement form.
- (13) [5 pts.] Use a Karnaugh map to convert the following expression to minimum SOP form: $(W + \bar{X} + Y + \bar{Z})(\bar{W} + X + \bar{Y} + \bar{Z})(\bar{W} + \bar{X} + \bar{Y} + Z)(\bar{W} + \bar{X} + \bar{Z})$
- (14) [5 pts.] Use a Karnaugh map to simplify the Boolean expression $AC[\bar{B} + B(B + \bar{C})]$ to a minimum SOP form.
- (15) [4 pts.] Minimize the following SOP expression using a Karnaugh map:

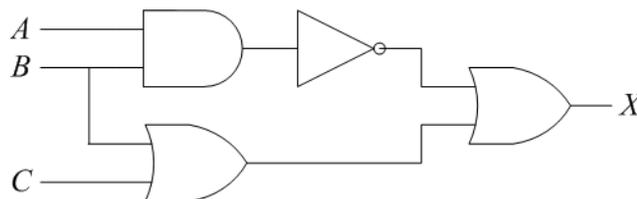
$$X = \bar{A}\bar{B}\bar{C}\bar{D}\bar{E} + \bar{A}\bar{B}\bar{C}D\bar{E} + \bar{A}\bar{B}C\bar{D}\bar{E} + \bar{A}\bar{B}CD\bar{E} + \bar{A}B\bar{C}\bar{D}\bar{E} + \bar{A}B\bar{C}D\bar{E} + \bar{A}BC\bar{D}\bar{E} + \bar{A}BCD\bar{E} + \bar{A}B\bar{C}\bar{D}E + \bar{A}B\bar{C}DE + \bar{A}BC\bar{D}E + \bar{A}BCDE$$
- (16) [4 pts.] Write the minimum SOP expression for the following Karnaugh map (Note that the 'X's in the truth table denote **don't care terms**.):

CD \ AB	00	01	11	10
00	1	0	X	X
01	1	0	0	1
11	0	X	0	X
10	X	0	1	1

- (17) [2 pts.] Draw the logic circuit represented by the following Boolean expression:

$$X = \bar{A}B(C + \bar{D})$$

- (18) [4 pts.] Write the minimum SOP expression for the following logic circuit.



- (19) [4 pts.] Apply DeMorgan's theorem to the Boolean expression $\overline{\overline{AB}(C + \overline{DE})}$.
- (20) [2 pts.] Determine which of the following even parity codes are in error:
(a) 100110010
(b) 011101010
- (21) [2 pts.] Convert the binary number $(101101)_2$ to decimal.
- (22) [2 pts.] Convert the octal number $(7265)_8$ to hexadecimal.
- (23) [2 pts.] Convert the decimal fraction number $(0.913)_{10}$ to binary (6 binary places).
- (24) [4 pts.] Express the decimal number $(-35)_{10}$ as an 8-bit number in the sign-magnitude form and the 1's complement form.
- (25) [2 pts.] Develop a truth table for the following Boolean expression:
 $X = (A + B)(A + C)(A + B + C)$