



The University of Lahore

CS & IT Department

CS4349 Digital Logic Design Mid Term Exam (Fall 2016)

Date: 19/11/2016

Time Allowed: 90 minutes

Max. Marks: 30

Question No. 1:

(a) Convert the following binary numbers to decimal: 1001101, 1010011.101 and 10101110.1001

(b) Determine the radix r of following number.

$$(BEE)_r = (2699)_{10}$$

[1.5 + 1.5 = 3 Marks]

Question No. 2: Represent the decimal numbers 694 and 835 in BCD. And then show the steps necessary to form their sum. **[2 Marks]**

Question No. 3: Show the configuration that represents the decimal number 255 in

(a) Binary

(b) BCD

(c) ASCII

(d) ASCII with odd parity

[1+1+1+1 = 4 Marks]

Question No. 4: Prove the identity by means of Boolean Algebraic Manipulation.

(a) $Y + X'Z + XY' = X + Y + Z$

(b) $X'Y' + Y'Z + XZ + XY + YZ' = X'Y' + XZ + YZ'$

[2+2 = 4 Marks]

Question No. 5: Reduce the following Boolean expressions to the indicate number of literals:

(a) $X'Y' + XYZ + X'Y$ to three literals.

(b) $X + Y(Z + (X + Z)')$ to two literals.

(c) $W'X(Z' + Y'Z) + X(W + W'YZ)$ to one literal.

(d) $(AB + A'B')(C'D' + CD) + (AC)'$ to four literals.

[1+1+1+1 = 4 Marks]

Question No. 6: For the Boolean functions E and F, as given in the following truth table:

| X | Y | Z | E | F |
|----------|----------|----------|----------|----------|
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 1 |

- List the minterms and maxterms of each function.
- List the minterms of E' and F' .
- List the minterms of $E + F$ and $E.F$
- Express E and F in sum of minterms algebraic form.
- Simplify E and F to expressions with a minimum of literals. **[1+1+1+1+1 = 5 Marks]**

Question No. 7: Optimize the following Boolean expressions using a map.

- $X'Z' + YZ' + XYZ$
- $A'B + B'C + A'B'C'$
- $A'B' + AC' + B'C + A'BC'$ **[2+2+2 = 6 Marks]**

Question No. 8: Optimize the following Boolean function using three variable map.

$$F(X, Y, Z) = \sum(0, 2, 6, 7) \quad \text{[2 Marks]}$$