

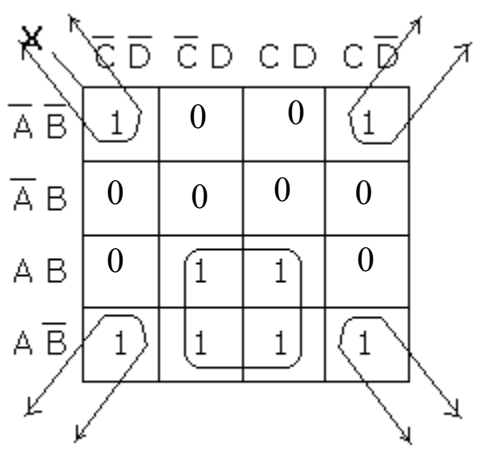
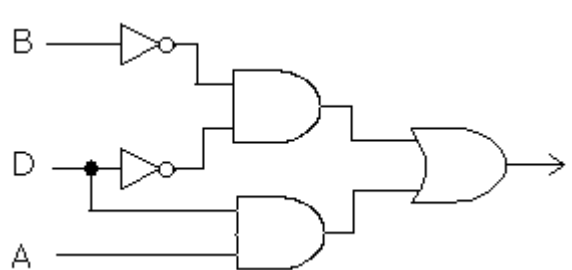
SAMPLE No 2 DE1 EXAM Solution

: DIGITAL MODULE ELECTRONICS 1MOD. CODE: ET1003

No	SOLUTION									
A	<p><u>SECTION – A</u> (2 marks each)</p> <p>1) (d) 2) (d) 3) (c) 4) (a) 5) (a)</p> <p>6) (a) 7) (a) 8) (a) 9) (a) 10) (d)</p> <p><u>SECTION – B</u> (10 marks each)</p> <p>B1</p> <p>(a) Sequence $FC_{16} \rightarrow FD, FE, FF, 100, 101, 102 \rightarrow 103_{16}$</p> <p>(b) Hexadecimal F A 6 7₁₆ to Binary = 1111 1010 0110 0111₂</p> <p>(c) Decimal 367₁₀ to Binary₁₀ to Binary</p> <table><tr><td>16</td><td>3 6 7</td><td>Remainder</td></tr><tr><td>16</td><td>2 2</td><td>F</td></tr><tr><td></td><td>1</td><td>6</td></tr></table> <p>Thus 367₁₀ = 1 6 F_H = 1 0110 1111₂</p> <p>(d) 1 101 100 111₂ to Octal 1 5 4 7₈</p>	16	3 6 7	Remainder	16	2 2	F		1	6
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	1	6								

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B2	<p>Given Equation is</p> <p>(a) $Y = \overline{\overline{A(\overline{B}C + B\overline{D})} + \overline{A}B}$ $= \overline{A(\overline{B}C + B\overline{D})} \cdot \overline{\overline{A}B}$ $= A(\overline{B}C + B\overline{D}) \cdot AB$ $= AB(\overline{B}C + B\overline{D})$ $= AB\overline{B}C + AB B\overline{D}$ $= AB\overline{D}$</p> <p>(b) </p> $X = \overline{B}\overline{D} + AD$ <p>Simplest implementation is</p> 

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B3	<div><p>CLK</p><p>PRE</p><p>CLR</p><p>Din</p><p>Z</p><p>H</p><p>L</p></div>																																																			
B4	<div><p>(a)</p><table><thead><tr><th>A</th><th>B</th><th>C</th><th>Y</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></tbody></table></div> <div><p>(b)</p>$Y = ABC + \overline{A}B\overline{C} + \overline{A}BC + A\overline{B}\overline{C} + A\overline{B}C$$= B(AC + \overline{A}\overline{C} + \overline{A}C + A\overline{C}) + A\overline{B}\overline{C}$$= B(1) + A\overline{B}\overline{C}$$= B + A\overline{B}\overline{C}$<p>OR</p><table><thead><tr><th></th><th>$\overline{B}\overline{C}$</th><th>$\overline{B}C$</th><th>BC</th><th>$B\overline{C}$</th></tr></thead><tbody><tr><th>\overline{A}</th><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><th>A</th><td>1</td><td>0</td><td>1</td><td>1</td></tr></tbody></table></div>	A	B	C	Y	0	0	0	0	0	0	1	0	0	1	0	1	0	1	1	1	1	0	0	1	1	0	1	0	1	1	0	1	1	1	1	1		$\overline{B}\overline{C}$	$\overline{B}C$	BC	$B\overline{C}$	\overline{A}	0	0	1	1	A	1	0	1	1
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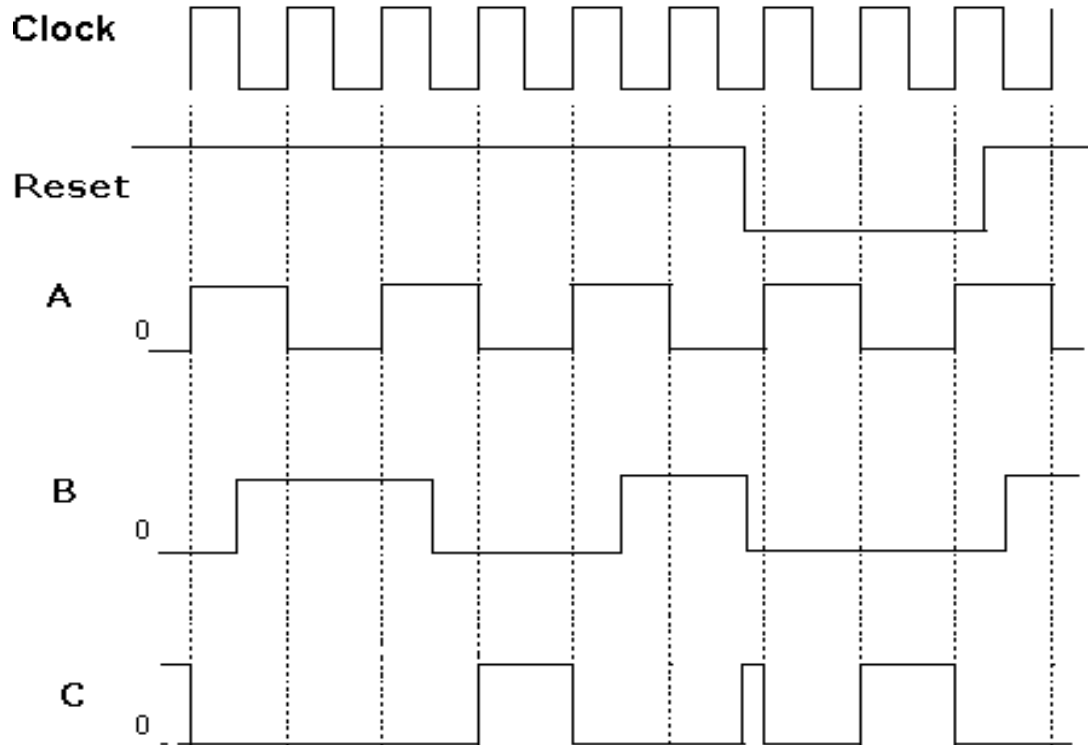
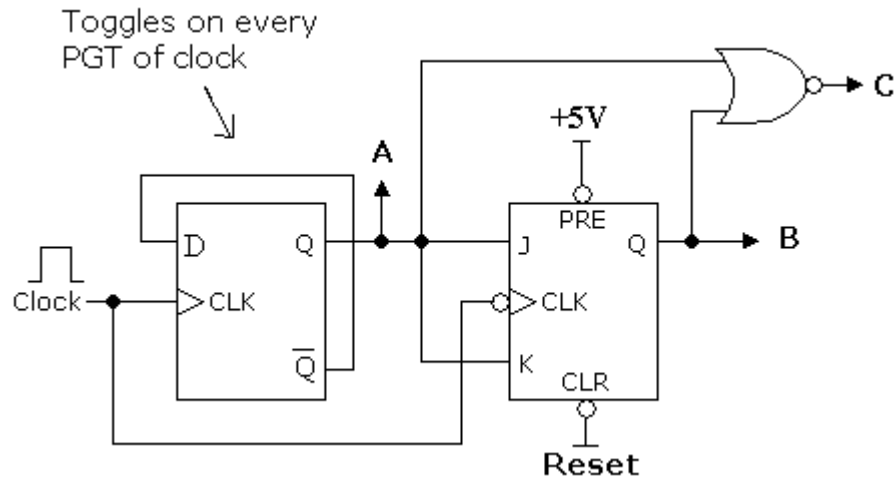
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No	SOLUTION
B5	
(a)	From the circuit, $X = \overline{\overline{A + B}} + \overline{\overline{B + C}} + (\overline{B + C}).D$
(b)	$ \begin{aligned} X &= \overline{\overline{A + B}} . (\overline{\overline{B + C}}) + (\overline{B + C}).D \\ &= (A + B) . (B + C) + (\overline{B + C}).D \\ &= AB + AC + BB + BC + \overline{B} \overline{C} D \\ &= B(1 + A + C) + AC + \overline{B} \overline{C} D \\ &= AC + B + \overline{B} \overline{C} D \\ &= AC + B + \overline{C} D \end{aligned} $
(c)	<p>Determine the output level of X if A = 1, B = 0, C = 1, D = 0</p> <p>Substituting into the equation $X = AC + B + \overline{C} D$,</p> $ \begin{aligned} &= 1.1 + 0 + 0.0 \\ &= 1 \end{aligned} $

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B6



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C1																																																																																																																			
(a)	<table><tr><th colspan="4">Inputs</th><th colspan="2">Outputs</th></tr><tr><th colspan="2">Number A</th><th colspan="2">Number B</th><th colspan="2">Number Y</th></tr><tr><th>A₁</th><th>A₀</th><th>B₁</th><th>B₀</th><th>Y₁</th><th>Y₀</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td></tr></table>	Inputs				Outputs		Number A		Number B		Number Y		A ₁	A ₀	B ₁	B ₀	Y ₁	Y ₀	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	1	1	1	1	0	1	0	0	0	1	0	1	0	1	0	0	0	1	1	0	1	0	0	1	1	1	1	1	1	0	0	0	0	1	1	0	0	1	0	1	1	0	1	0	0	0	1	0	1	1	1	1	1	1	0	0	0	1	1	1	0	1	0	1	1	1	1	0	0	1	1	1	1	1	0	0
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C1 (b)	<div style="text-align: center;"> Y_1 <table border="1"> <tr> <th></th> <th>$\overline{B_1}\overline{B_0}$</th> <th>$\overline{B_1}B_0$</th> <th>$B_1\overline{B_0}$</th> <th>$B_1B_0$</th> </tr> <tr> <td>0 0 $\overline{A_1}\overline{A_0}$</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>0 1 $\overline{A_1}A_0$</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1 1 A_1A_0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1 0 $A_1\overline{A_0}$</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> </table> </div> $Y_1 = \overline{A_1}B_1 + \overline{A_0}B_1B_0$ <div style="text-align: center;"> Y_0 <table border="1"> <tr> <th></th> <th>$\overline{B_1}\overline{B_0}$</th> <th>$\overline{B_1}B_0$</th> <th>$B_1\overline{B_0}$</th> <th>$B_1B_0$</th> </tr> <tr> <td>0 0 $\overline{A_1}\overline{A_0}$</td> <td>0</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>0 1 $\overline{A_1}A_0$</td> <td>1</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1 1 A_1A_0</td> <td>1</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1 0 $A_1\overline{A_0}$</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> </tr> </table> </div> $Y_0 = A_1B_1 + A_0B_0 + A_0B_1\overline{B_0} + A_1B_1B_0 + A_1A_0B_0$		$\overline{B_1}\overline{B_0}$	$\overline{B_1}B_0$	$B_1\overline{B_0}$	B_1B_0	0 0 $\overline{A_1}\overline{A_0}$	0	0	1	1	0 1 $\overline{A_1}A_0$	0	0	1	1	1 1 A_1A_0	0	0	0	0	1 0 $A_1\overline{A_0}$	0	0	1	0		$\overline{B_1}\overline{B_0}$	$\overline{B_1}B_0$	$B_1\overline{B_0}$	B_1B_0	0 0 $\overline{A_1}\overline{A_0}$	0	1	1	0	0 1 $\overline{A_1}A_0$	1	0	1	0	1 1 A_1A_0	1	1	0	1	1 0 $A_1\overline{A_0}$	1	1	1	0
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C1 (c)	$Y_1 = \overline{\overline{A_1 B_1} + \overline{A_0 B_1 B_0}}$ $= \overline{\overline{A_1 B_1}} \cdot \overline{\overline{A_0 B_1 B_0}}$ 