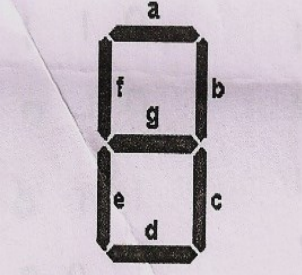


Q1	A digital circuit takes an excess-3 code (MNOP, M: MSB, P: LSB) as input and display its equivalent decimal number (D) as output. A circuit is to be designed to detect decimal number 0,1,4,6,7 and 8 from the input. Plot a k-map and identify the all the PI's and EPI's for the design. Write all the minimum SOP form(s).	[13]																																																															
Q2	<p>The PI chart for a function $F(A, B, C, D)$ is given below. Answer the following questions:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Term--></th> <th>3</th> <th>4</th> <th>7</th> <th>9</th> <th>10</th> <th>11</th> </tr> </thead> <tbody> <tr> <td>PI</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>0 0 - -</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>- 0 - 1</td> <td>X</td> <td></td> <td></td> <td>X</td> <td></td> <td>X</td> </tr> <tr> <td>- 0 1 -</td> <td>X</td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>- - 1 1</td> <td>X</td> <td></td> <td>X</td> <td></td> <td></td> <td>X</td> </tr> <tr> <td>1 - - 1</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td>X</td> </tr> <tr> <td>1 - 1 -</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td>X</td> </tr> <tr> <td>0 - 0 0</td> <td></td> <td>X</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>a. Provide all the Max terms for the function F in decimal format. b. Provide all the don't care terms of F in decimal format. c. Write all the minimized sum of product expression for F.</p>	Term-->	3	4	7	9	10	11	PI							0 0 - -	X						- 0 - 1	X			X		X	- 0 1 -	X				X	X	- - 1 1	X		X			X	1 - - 1				X		X	1 - 1 -					X	X	0 - 0 0		X					[13]
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Q3	A combinational circuit having 4-inputs (A, B, C, D, A: MSB, D: LSB) and 3-outputs F1, F2, F3 specified by the following functions $F1(A, B, C) = \sum m(4, 5, 6)$; $F2(A, B, C) = \sum m(0, 4, 5)$; $F3(A, B, C) = \sum m(0, 1, 3, 6)$ Draw the minimum size PLA programming table and mention the size of PLA.	[12]																																																															
Q4	<p>A digital circuit takes a BCD number (PQRS, P: MSB, S: LSB) as input and display its equivalent decimal number on a seven segment display. The seven segments of the display are named as shown in the figure. The segment is ON if input is 1 and OFF if input is 0. Design a digital logic circuit for a signal segment "a" of the seven segment display for the BCD input. Realize the obtained expression using only required numbers of 2-input NAND gates. Only TRUE inputs are available for design.</p> 	[11]																																																															
Q5	Realize a full subtractor using only the required number of Half subtractors. Only TRUE inputs are available for design.	[10]																																																															
Q6	A digital circuit takes BCD number (ABCD, A: MSB, D: LSB) as the input and generates its equivalent excess-3 code (WXYZ, W: MSB, Z: LSB) as the output. Design and realize the digital circuit using only minimum numbers of decoders and encoders of suitable size. Encoders and Decoders have active high output and active high enable.	[09]																																																															
Q7	Implement the following Boolean function using minimum numbers of 2x1 mux only. MUX have active high output and active high enable. $F(A, B, C, D) = \sum m(1, 2, 4, 7, 8, 9, 10, 11, 13, 15)$	[12]																																																															
Q8	Realize the following function using only required number of 2:4 decoders. $F = A'D + ABC' + AD + BD + AC + AD'$. Only true inputs are available. The 2:4 decoders have active high output and active high enable.	[10]																																																															