Birla Vishwakarma Mahavidiyalaya

Course Code : 2CP03	**Course Title : Digital and Logic design**	
Date : 08-07-2021	**Time : 10:00 to 13:30**	**Maximum Marks: 49**

Instructions :

- Exam will be conducted by 'Online' Mode through MS Teams only.
- Write ID No., Name, Course Code, Course Title, Date of Exam, Signature and Page Nos. on each answer page in the 'title block' provided in format.
- Give the name to each pdf file as: "ID No._Course Code_Section No._Date" (For example, 12AB001_3CD01_Section_1_03.1
- The text just below marks indicates the CO(s) followed by the Bloom's level of the question, i.e., R: Remember, U: Understand, A: Apply, N: Analyze, E: Evaluate, C: Create

Section - I

1. (a) Attempt the following.(**Any Five**) [10]
   i. Determien the value of base x if $(211)_x = (152)_8$
   Convert $(2110201102220112)_3$ to base 9.
   ii. The state of a 12-bit register is 100010010111. What is its content if it represents (i) Three decimal digits in the excess-3 code? (ii) A binary number?
   iii. From the following equation, find the radix r.
   $[(35)_r + (24)_r]x(21)_r = (1501)_r$
   iv. Find the value of the Binary Variables A,B,C & D by solving following simultaneous equations given below.
   $A' + AB = 0$
   $AC = AB$
   $AD + D' + BD = AC + B'D$
   v. Represent the following pair of decimal numbers into signed 2's complement representation and add them. (i) 33 and 15 (ii) -110 and -84
   vi. State the algorithm to add two BCD numbers. Represnet the unsigned decimal numbers 791 and 658 in BCD,and then show the steps necessary to form their sum.

   (b) Find the complement of the following function:
   $(x + y' + z)(x' + z')(x + y)$

2. (a) An 8x1 multiplexer has inputs A,B and C connected to the selection inputs S2,S1 and S0 respectively. The data inputs, I0 through I7, are connected as follows:I1=I2=I5=0,I3=I7=1,I4=I0=D and I6=D'.Determine the Boolean Function that the multiplexer implements [04]

   OR OR OR

   (a) Implement the following function F with the following two-level forms: NANAD-AND,AND-NOR,OR-NAND,NOR-OR [04]
   $F(A, B, C, D) = \sum(0, 1, 2, 3, 4, 8, 9, 12)$

   (b) Design a combinational logic circuit for the following system. The system is a speed-warning device. It receives, on two lines, an indication of the speed limit of the three tracks on Express Highway. There are 3 possible values: 100 kmph, 110 kmph & 120 kmph. It receives from the automobile, on other two lines, an indication of the speed of the vehicle. There are 4 possible values: under 100 kmph, between 101 kmph & 110 kmph, between 111 kmph & 120 kmph and over 120 kmph. It produces two outputs. The first, F, indicates whether the car is going above the speed limit. The second, G, indicates that the car is driven at a "Dangerous speed". The "Dangerous speed" is defined as either speed is over 120 kmph or more than 10 kmph above the speed limit of the track. (kmph stands for Kilometer Per Hour.) [06]

3. (a) Construct 5x32 decoder using only 3x8 decoders. [03]

(b) Find all the prime implicants for the following Boolean functions, and determine which are essential: [04]

(a) $F(w, x, y, z) = \sum(0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

$F(A, B, C, D) = \sum(0, 2, 3, 5, 7, 8, 10, 11, 14, 15)$

OR OR OR

(b) Simplify the following Boolean function F, together with the don't care conditions d, and them expresst he simplified function in sum-of-mintermns form: [04]

i. $F(x, y, z) = \sum(0, 1, 4, 5, 6)$ and $d(x, y, z) = \sum(2, 3, 7)$

ii. $F(A, B, C, D) = \sum(0, 6, 8, 13, 14)$ and $d(x, y, z) = \sum(2, 4, 10)$

(c) Simplify the following function by means of the tabulation method: [03]

$F(A, B, C, D) = \sum(3, 4, 13, 15)$

4. Can add a Image like this [04]

$J_A = Bx + B'y'$ $K_A = B'xy'$

$J_B = A'x$ $K_B = A + xy'$

$z = Ax'y' + Bx'y'$

Figure 1: This is the test image

5. The McQ Formats available are [04]

A. one B. two C. three D. four

OR OR OR

A. one

B. two

C. three

D. four

6. Shapes Mcq Formats are

◯ one ◯ two ◯ three ◯ four

OR OR OR

☐ one ☐ two ☐ three ☐ four

7. Can Create a Solution line with default lines or empty box or dotted line or grid or a small line for the mcq on the right hand side all with custom height [03]

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7. _____

8.

Question:	1	2	3	4	5	6	7	8	Total
Points:	10	14	14	4	4	0	3	0	49
Score:									

*****End of Exam*****