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**BIEL-030**

# DIPLOMA – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (DECVI) / ADVANCED LEVEL CERTIFICATE COURSE IN ELECTRONICS AND COMMUNICATION ENGINEERING (ACECVI)

## Term-End Examination

## June, 2017

00094

## BIEL-030 : DIGITAL ELECTRONICS

*Time : 2 hours* *Maximum Marks : 70*

***Note :*** *Attempt any* ***five*** *questions. Question no.* ***1*** *is* ***compulsory****. Use of scientific calculator is allowed.*

**1.** Choose the correct answer for the following : *7×2=14*

(a) For the given logic circuit shown in Figure 1 below, the output Y is equal to

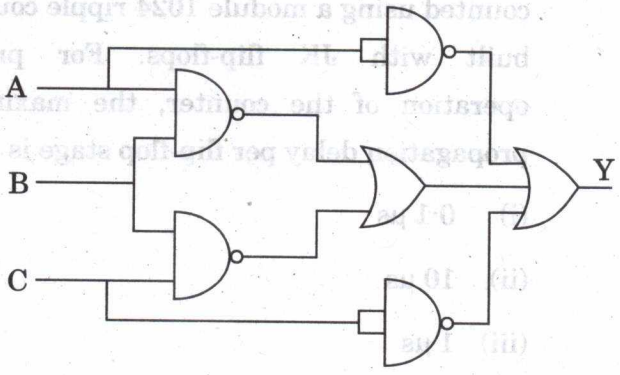


*Figure 1*

(i) $\overline{ABC}$

(ii) $\bar{A} + \bar{B} + \bar{C}$

(iii) $\overline{AB} + \overline{BC} + \bar{A} + \bar{C}$

(iv) $\overline{AB} + \overline{BC}$

(b) 2's complement representation of a 16-bit number (one sign bit and 15 magnitude bits) is FFFF. Its magnitude in decimal representation is

(i) 0

(ii) 1

(iii) 32·767

(iv) 65·535

(c) A pulse train with a frequency of 1 MHz is counted using a module 1024 ripple counter built with JK flip-flops. For proper operation of the counter, the maximum propagation delay per flip-flop stage is

(i) 0·1 μs

(ii) 10 μs

(iii) 1 μs

(iv) 0·01 μs

(d) The Boolean expression $\overline{A\,\overline{(B+\overline{C})}\,D}$ is equal to

(i) $A + \overline{B} + \overline{C}D$

(ii) $\overline{A} + \overline{B} + C + D$

(iii) $\overline{A} + B + C + \overline{D}$

(iv) $\overline{A} + B + \overline{C} + \overline{D}$

(e) The speed of conversion is maximum in a

(i) Successive-approximation A/D converter

(ii) Parallel-comparative A/D converter

(iii) Counter ramp A/D converter

(iv) Dual slope A/D converter

(f) The gates required to build a Half adder are

(i) EX-OR gate and NOR gate

(ii) EX-OR gate and OR gate

(iii) EX-OR gate and AND gate

(iv) four NAND gates

(g) Which of the following is the fastest logic ?

(i) TTL

(ii) ECL

(iii) CMOS

(iv) LSI

2. (a) Minimize the logic function

$Y(A, B, C, D) = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 11, 14)$.

Use Karnaugh map. Draw the logic circuit for the simplified function. *10*

(b) Simplify the given expression to its Sum of Products (SOP) form. Draw the logic circuit for the simplified SOP function

$Y = (A + B)(A + \overline{AB})C + \bar{A}(B + \bar{C}) + \bar{A}B + ABC.$ *4*

3. (a) Design a 8-to-1 multiplexer by using the four-variable function given by

$F(A, B, C, D) = \sum m(0, 1, 3, 4, 8, 9, 15)$. *10*

(b) Convert the decimal number 82·67 to its binary, hexadecimal and octal equivalents. *4*

4. (a) Prove the following Boolean identities : *6*

(i) $XY + YZ + \bar{Y}Z = XY + Z$

(ii) $A.B + \bar{A}.B + \bar{A}.\bar{B} = \bar{A} + B$

(b) Add 648 and 487 in BCD code. *4*

(c) Add 20 and (– 15) using 2's complement. *4*

5. (a) Explain a half adder with the help of a truth table and logic diagram. *10*

(b) With the help of a suitable diagram, explain how to convert a JK flip-flop to a T-type flip-flop. *4*

6. Using D flip-flops and waveforms, explain the working of a 4-bit SISO shift register. *14*

7. (a) With the help of an R2R binary ladder, explain the working of a 4-bit D/A converter. *10*

(b) Compare the memory devices RAM and ROM. *4*

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