## R09

Code: 9A04306

Max. Marks: 70
Time: 3 hours
B.Tech II Year I Semester (R09) Supplementary Examinations June 2016

DIGITAL LOGIC DESIGN
(Computer Science \& Engineering)
Answer any FIVE questions
All questions carry equal marks
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1 (a) Apply the number conversions from one system to other using its base:
(i) $(344.25)_{10}=()_{2}$.
(ii) $(1001110.01)_{2}=()_{10}$.
(iii) $(\text { CDEF })_{16}=()_{2}$.
(iv) $(572)_{8}=()_{16}$.
(b) Given the binary numbers $X=1110110$ and $Y=1100010$. Perform the subtraction $X-Y$ and $Y-X$ using complements.

2 (a) Realize basic logic gates using Universal gates.
(b) Simplify the following expression $Y=(A+B)\left(A+C^{\prime}\right)\left(B^{\prime}+C^{\prime}\right)$.

3 Simplify the following Boolean function, using five variable maps:
$F(A, B, C, D, E)=\Sigma(0,1,4,5,16,17,21,25,29)$
4 (a) Design a 4-bit adder-subtractor circuit and explain the operation in detail.
(b) Design a $4 \times 1$ multiplexer and explain the working

5 Explain the working of the following:
(a) J-K flip-flop.
(b) S-R flip-flop.
(c) D-flip-flop.

6 Explain the design of a 4-bit binary counter with parallel load in detail.
7 Design a combinatorial circuit using ROM and PLA. The circuit accepts 3-bit number and generates output binary number equal to square of input number.

8 An asynchronous sequential circuit has two internal states and one output. The excitation and output functions describing the functions are:

$$
\begin{aligned}
& Y_{1}=x_{1} x_{2}+x_{1} y_{2}{ }^{\prime}+x_{2}^{\prime} y_{1} . \\
& Y_{2}=x_{2}+x_{1} y_{1}^{\prime} y_{2}+x_{1}^{\prime} y_{1} . \\
& Z=x_{2}+y_{1} .
\end{aligned}
$$

Implement the circuit defined above with NAND SR latches.

