



US – 405

IV Semester B.Sc. Examination, May 2017
(CBCS) (2015-16 and Onwards) (Fresh+Repeaters)
ELECTRONICS – IV
Digital Electronics and Verilog

Time : 3 Hours

Max. Marks : 70

Instructions: Answer **all** questions from Part – A, **any five** questions from Part – B and **any four** questions from Part – C.

Note: It is required to answer **all** the questions of Part – A in **any one** page and to be answered only **once**. In this Part answering the **same** question multiple times will **not** be considered for evaluation.

PART – A

Answer **all** the subdivisions :

(15×1=15)

1. i) The output of a gate is LOW only when all the inputs are HIGH. The gate is
a) AND b) NAND c) OR d) NOR
- ii) The maxterm representation of $A + \bar{B} + C$ is
a) M_2 b) M_4 c) M_5 d) M_3
- iii) In a 4 variable K-map, an octet eliminates
a) Three variables and their complements
b) Two variables and their complements
c) One variable and its complement
d) Four variables and their complements
- iv) In a certain digital waveform, the period is twice the pulse width. The duty cycle is
a) 100% b) 66% c) 50% d) 0%
- v) The input to a BCD-to-7 segment decoder is 0101. The active outputs are
a) a, c, f, g b) a, b, c, f, g, c) b, c, e, f d) a, c, d, f, g
- vi) The IC 74147 is
a) Decimal to BCD priority encoder
b) BCD to decimal decoder
c) BCD to 7-segment decoder
d) 4-bit magnitude comparator

P.T.O.



- vii) In a negative edge triggered JK flip-flop, $J=K=1$. The clock frequency is 10 kHz. The frequency of Q output is
a) 20 kHz b) 10 kHz c) 5 kHz d) 1 kHz
- viii) A three - bit counter has _____ possible natural counts.
a) 7 b) 8 c) 9 d) 12
- ix) _____ has the highest priority in a JK flip-flop.
a) J input b) K input c) Preset input d) Clock input
- x) In Verilog, the bit pattern for the constant 12' h13x is
a) 0001101xxxx b) 00001101xxxx
c) 00010011xxxx d) 000011010000
- xi) In verilog 'h1234 is a
a) 16 bit number b) 32 bit number
c) 64 bit number d) 8 bit number
- xii) Which is the correct method of specifying time scale in verilog ?
a) 110ns/10ps b) 100ns/10ps c) 100ns/12ps d) 101ns/10ps
- xiii) In the verilog statement *assign # (4, 8) a = b;* the turn off delay is
a) 4 time units b) 8 time units c) 4 ns d) 8 ns
- xiv) The statements in a *begin ... end* block are executed
a) Concurrently b) Sequentially
c) Randomly d) None of the above

xv) initial

begin

```
#5 x = 1'b0 ; //statement 1
```

```
#15y = 1'b1 ; //statement 2
```

end

In the above verilog code, the statement 2 will be executed at

- a) 15 time units b) 20 time units
c) 5 time units d) Current simulation time



PART – B

Answer **any five** questions :

(5×7=35)

2. a) Realize AND, EXOR, OR and NAND gates using only NOR gates.
b) Draw the circuit of a CMOS inverter and explain its operation. (4+3)
3. What is a decoder ? Draw the logic circuit of a 3 : 8 decoder with active LOW outputs. Explain its operation with the help of its truth table. 7
4. a) With a neat circuit diagram explain the operation of a 4 – bit Digital-to-analog converter with binary weighted resistors. Write the expression for its analog output.
b) Write the truth table of a full adder. (5+2)
5. a) Explain the operation of a negative edge triggered JK flip-flop with its block diagram. Write its truth table and timing diagram.
b) What are preset and clear inputs in a flip-flop ? (5+2)
6. Design a mod – 5 synchronous counter using K – Map technique. 7
7. a) Distinguish between *wor* and *tril* nets with their syntax and truth tables.
b) Define the terms synthesis, test bench and vector net. (4+3)
8. a) Describe dataflow style of verilog. How does it differ from behavioural style ?
b) With the help of a circuit diagram, write a verilog code for 4 : 2 encoder in dataflow style. Also write its truth table. (4+3)
9. Explain the procedural and continuous assignments in verilog with examples for each.

PART – C

Answer **any four** questions :

(4×5=20)

10. Simplify the following Boolean expression and implement the simplified expression.

$$Y = \overline{\overline{\overline{A.B.C}} . \overline{CD}} + D$$

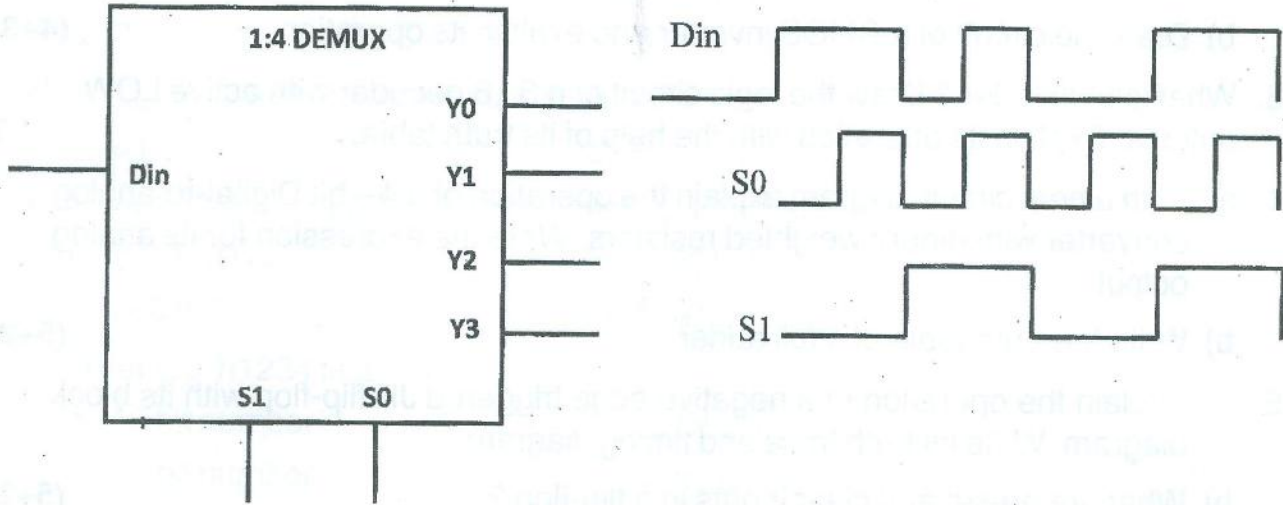
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11. Using K-map simplify the following Boolean expression and realize the simplified expression using gates. 5

$$Y(A, B, C, D) = \sum m(5, 7, 8, 10, 13, 15) \text{ and don't care condition}$$
$$d(A, B, C, D) = \sum m(0, 1, 2, 6).$$



12. Draw the output waveforms for Y0, Y1, Y2 and Y3 for the given inputs. 5



13. Draw the logic circuit diagram of a 4-bit Serial-in-serial-out shift register and explain its operation taking the data 1101 as an example. 5

14. Write a verilog code to implement full subtractor. Write its truth table. 5

15. Write a verilog code to implement 2 – bit magnitude comparator. 5