

Roll No.

76614

**M.Sc. Physics 3rd Semester (New)
w.e.f. December, 2013
Examination-December, 2015**

ELECTRONICS-I (SPECIAL PAPER-II)

Paper : XIII (ii)

Time : 3 hours

Max. Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

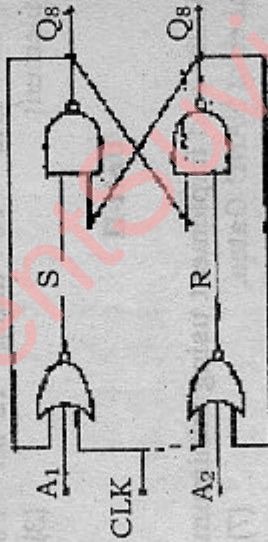
Note : Attempt five questions in all selecting one question from each unit. Question No. 1 is compulsory.

1. (a) Find the number system in which 377 is equal to decimal number 605. (4)
- (b) Prove using Boolean algebra : $A\bar{B} + \bar{A}CD + \bar{A}BD + \bar{A}BC\bar{D} = \bar{B} + \bar{A}C\bar{D}$ (4)
- (c) Design a system use to determine whether the sum of binary bits in a word is odd or even. (4)
- (d) Describe n-channel MOS NAND gate. (4)

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Unit-III

6. (a) Find the output of a logic circuits and hence draw the truth table. (6)



- (b) Explain with circuit diagram, 1-bit storage cell. (4)
- (c) Design half adder using NAND gates only. (5)
7. (a) Design and explain divide by 8 counter. (6)
- (b) Discuss the race around condition if J K flip flop. (4)
- (c) Construct 8 to 1 line multiplexer. (6)

Unit-IV

8. (a) Sketch the cross section of n-channel depletion type MOSFET. Explain its drain characteristics and transfer curve. (10)
- (b) Explain CMOS NOR gate for positive logic. (6)
9. Explain : (8)
- (a) Static MOS shift register. (8)
- (b) Two phase dynamic MOS Inverter. (8)

76614-1250-(P-4)(Q-9)(15) (4)

Unit-I

2. (a) Add 917 + 255 in BCD representation. (4)
(b) Convert (4)
(i) Gray Code 101010111 to binary
(ii) Binary 101011011001, 10101 to Hexadecimal
- (c) Find the decimal equivalent of 10100111. Assuming the given number in 1's complement representation. (4)
- (d) Using two's complement subtract the following: (4)
(i) 110011-1001.11
(ii) 100001-110011
3. (a) Convert (4)
(i) Binary 110111 to gray code
(ii) Hexadecimal 0.63 to decimal equivalent
- (b) Add -46 and -25 using 2's complement representation. (3)
- (c) Perform the following operation (6)
(i) Subtract CD3.7 from A123.3

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- (ii) Subtract using 1's complement
10111.1 - 10011.1
- (d) Add 29 and -18 using 12-bit 1's complement. (3)

Unit-II

4. (a) Minimise and implement using minimum number of NAND Gates. (7)
F(A, B, C, D) = $\sum m(1, 4, 6, 9, 10, 11, 14, 15)$.
- (b) Draw a negative logic AND gate using diodes and explain its operation. (5)
- (c) Simplify using Boolean algebra (4)
$$Y = AB + \bar{A}\bar{C} + A\bar{B}C(A+B+C)$$
5. (a) Draw a negative logic NOT gate and explain its operation. (4)
- (b) Minimise and implement using minimum number of NOR Gates.

F(A,B,C,D) = $\prod M(0, 1, 3, 5, 6, 7, 9, 10, 11, 12, 13, 15)$

- (c) Prove using Boolean algebra : (5)
$$\bar{A}\bar{B} + \bar{A}\bar{C}\bar{D} + \bar{A}\bar{B}D + \bar{A}\bar{B}C\bar{D} = \bar{B} + \bar{A}\bar{C}\bar{D}$$

76614-1250-(P-4)(Q-9)(15) (3) [Turn Over