F.Y. B.Sc.(IT) : Sem. I

Digital Electronics

Time : 2½ Hrs.] Prelim Question Paper [Marks : 75

N.B.: (1) All questions are compulsory.
(2) Make suitable assumptions wherever necessary and state the assumptions made.
(3) Answer to the same questions must be written together.
(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

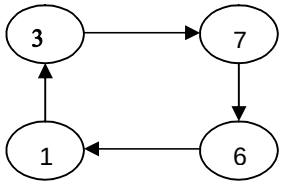
1. Attempt the following (any THREE) [15]
(a) Perform following conversion
(i) $(1\ 0\ 1\ 1\ 1\ 0\ 1\ 1)_2 = (?)_{10}$ (ii) $(88)_{10} = (?)_2$
(iii) $(249)_{10} = (?)_{16}$ (iv) $(1\ 1\ 1\ 1\ 0\ 0\ 1)_2 = (?)_{16}$
(v) $(1\ 0\ 1\ 1)_2 = (?)_{ex-3}$
(b) Perform following operations
(i) $(1\ 1\ 0\ 1\ 0\ 0)_2 = (?)_{Gray}$ (ii) $(28)_{10} + (16)_{10}$ in BCD
(iii) Give example of alphanumeric code & Error-correcting code.
(c) Perform following Arithmetic
(i) Subtract $(37)_{10}$ from $(53)_{10}$ using 2's complement
(ii) Divide (1 1 1 0 1 0 1) by 1001
(d) Perform following operations
(i) $(1\ 0\ 1\ 1\ 0\ 1) + (1\ 1\ 1\ 1\ 1\ 1\ 1)_2$ (ii) $(9)_{10} \times (11)_{10}$ using binary
(e) (i) Add $(7F)_{16}$ and $(BA)_{16}$ (ii) subtract $(7A)_{16}$ from $(CO)_{16}$
(f) (i) Compare analog and digital circuits.
(ii) $(29)_{10} = (?)_{EX-3}$

2. Attempt the following (any THREE) [15]
(a) Prove NAND gate and NOR gate as universal gate.
(b) Reduce the following expression using Boolean algebra and realize using basic gates
(i) $(x + y)(x + \bar{y})(\bar{x} + z)$
(ii) $ABC + ABC + \bar{A}\bar{B}\bar{C} + A\bar{B}C + A\bar{B}\bar{C} + \bar{A}\bar{B}C + AB\bar{C}$
(c) Minimize following expression using & realize using NAND gate
$F(A, B, C, D) = \sum m(1, 3, 5, 9, 11, 13)$
(d) Simplify & implement using logic gate
$f(A, B, C, D) = \pi m(0, 1, 2, 3, 5, 7, 11)$
(e) Design a combinational circuit whose input is 4-bit binary numbers is the 2's complement of input number.
(f) Draw symbol and truth table of :
(i) AND gate (ii) NOR gate (iii) NAND gate
(iv) OR gate (iv) NOT gate

3. Attempt the following (any THREE) : [15]
(a) Write the logical expression of conversion of Binary to Gray code using k-map.
(b) Explain the full adder with the help of k-map.
(c) Design BCD adder using IC7483.
(d) Design 1-bit magnitude comparator. State the IC number with diagram for 4-bit magnitude comparator.
(e) Using half adder and additional gates, design a controlled half adder half subtractor such that when control signal is logic 0, the entire circuit behave as half subtractor & when it is 1, it behaves as a half adder (H.A.)
(f) Design BCD to excess-3 converter.

4. Attempt the following (any THREE) [15]
   (a) What is the need of mux tree? Draw 64:1 mux using 16:1 mux.
   (b) What do you understand by decoder? Design full adder using 3:8 decoder.
   (c) What is race around condition? How can it be avoided?
   (d) Convert SR flip-flop into D flip-flop.
   (e) Compare combinational and sequential circuits.
   (f) Write a short note on ALU.

5. Attempt the following (any THREE) [15]
   (a) Compare synchronous and Asynchronous counter.
   (b) Design a 3-bit synchronous counter using D flip-flop.
   (c) Design module-7 counter using IC 7490.
   (d) Draw the circuit diagram for Bi–directional shift register and also draw the pin diagram of related IC.
   (e) Explain Johnson counter/twisted ring counter.
   (f) Design synchronous counter using T flip-flop.



Paper Discussion Schedule for all Subjects

Date	Day	Timing	Centre
1 Nov. 2016	Tuesday	6.00 p.m. to 7.00 p.m.	Nerul
2 Nov. 2016	Wednesday	9.00 a.m. to 11.00 a.m.	Andheri
2 Nov. 2016	Wednesday	12.00 p.m. to 2.00 p.m.	Dadar
2 Nov. 2016	Wednesday	3.00 p.m. to 5.00 p.m.	Thane

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