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Total Number of Pages : 02

B.Tech  
PEE4I103

4<sup>th</sup> Semester Regular / Back Examination 2018-19  
DIGITAL ELECTRONICS CIRCUITS  
BRANCH : ELECTRICAL  
Max Marks : 100  
Time : 3 Hours  
Q.CODE : F486

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- What is a single precision-Floating-point representation of numbers?
- Differentiate between active high and active low terms associated with inputs and outputs.
- According to you, which circuits are called as universal combinational circuits?
- Design a 2-bit equality detector, mention the functions used.
- How can you convert a decoder to demultiplexer?
- Among RAM and ROM which is widely used in current applications of data storage?
- Write the significance of Boolean algebra in digital circuits.
- How D/A conversion takes place?
- Explain the significance of gray and binary code.
- Prove the identity,  $1 + X + Y + \dots = 1$ , using truth table.

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Explain the operation of a 4-bit SIPO shift register using flip-flops and the timing diagram.
- Design a 32:1 MUX using 4:1 MUX(s) only. Mention the LSB and MSB in the diagram.
- Using NOR gates only, design  $Y(A,B,C) = AB + BC' + ABC$ .
- Design a decade counter that counts up.
- Design a 4-bit active low input decoder circuit. Show the truth table. Draw the necessary circuit.
- Express the complement of the following function in product-of-sum form.  
 $F(A, B, C, D) = \pi(1, 5, 6, 7, 9, 11, 12)$
- Explain the properties of TTL logic family in details.
- How will you convert a SR flip-flop to T flip-flop and vice-versa? Show the necessary tables and draw the diagrams.
- Given two numbers,  $A = 1110100$  and  $B = 1011011$ , perform the subtraction  $A - B$  and  $B - A$  using 1's complement method.
- Design a 4x3 binary multiplier circuit.
- Explain the Master-Slave operation using D flip-flop. Draw the necessary circuit diagrams.
- Differentiate between registers and shift registers. Give examples.

**Part-III**

**Only Long Answer Type Questions (Answer Any Two out of Four)**

**Q3 a)** Find all the prime implicants of the following function : **(8)**

$F(A, B, C, D) = \sum (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$ . Mention all the desired minimizations. **(8)**

**b)** Minimize the function:  $F(w, x, y, z) = \sum (4, 5, 6, 7, 12, 13, 14)$ ,  $d(w, x, y, z) = \sum (1, 9, 11, 15)$  **(8)**

**Q4** Design a 4-bit up-down asynchronous counter using a negative edge-triggered JK flip-flop. Consider the two asynchronous inputs and a synchronous clock. Draw the state diagram, necessary tables and final circuit diagram. **(16)**

**Q5** Using CMOS logic, implement the function  $F(A, B, C) = (A+B) \cdot (B+C) \cdot (A+C)$ . Draw the circuit diagram. Explain the operation. **(16)**

**Q6 a)** Explain the A/D and D/A conversion. **(10)**  
**b)** Differentiate between PAL and PLA. **(6)**