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PRANVEER SINGH INSTITUTE OF TECHNOLOGY, KANPUR

Even Semester Session 2022-23 Pre-University

B. Tech. IVSemester

Digital Electronics (KOE-049)

CO Number	Course Outcome
CO1	Define the concepts of Digital system (logic gates, Combinational Logic, Sequential Logic, Synchronous & Asynchronous Sequential Circuits and memory).
CO2	Explain the concepts of various digital devices and logic families.
CO3	Apply the concepts of digital devices on various applications.
CO4	Analyze various digital circuits, Sequential Logic, Synchronous & Asynchronous Sequential of different configuration.
CO5	Design various digital circuits, Sequential Logic, Synchronous & Asynchronous Sequential of different configuration.

Time: 3 Hrs. M. M. 100

Section A

Q1. Attempt all questions: **(2X10 =20 Marks)**

a) Find the 2's complement of number $(23)_8$. CO1

b) Convert the number $(155.25)_{10} = ()_{16}$. CO1

c) Draw the Ex-NOR gate using NAND gates. CO1

d) Differentiate between synchronous counter and asynchronous counter. CO2

e) Draw full adder using NOR gates only. CO1

f) Define the term max term and give the suitable example for the same. CO1

g) Explain race around condition in JK flip flop. How we can remove it. CO2

h) Draw 1-bit comparator circuit. CO1

i) Find the characteristics equation of JK flip flop. CO2

j) What do you mean Power dissipation in context with digital logic family? CO1

Section B

Q2. Attempt all questions. Question No 2(a) is compulsory: **(10X3 = 30 Marks)**

a Explain the circuit diagram and operation of 4-bit Comparator. CO2

b i) Apply the concept of flip-flop and multiplexer to implement universal shift register. Explain its different mode of operation with suitable diagram. CO3

Or

ii) By using flip-flop and combinational circuit implement bidirectional shift register. Explain its working in various modes. CO3

c i) Design all basic and universal gates using multiplexer circuit only. CO5

Or

ii) Design a BCD adder circuit. Also explain its working with suitable diagrams. CO5

Section C

Q3. Attempt all questions:

a i) **(10X5 = 50 Marks)**

i)Simplify the given function using tabular method. CO4

$F(A, B, C, D) = \sum m(0,1,4,6,8,9,10,12) + d(5,7,14)$

Or

ii) Simplify the given function using Mc-Cluskey minimization technique. CO4

$F(A, B, C, D) = \sum m(0,1,3,4,5,6,11,13,14,15)$

b i) Design a 3 bit Synchronous up/down counter with JK flipflop. CO5

Or

ii) For MOD-10 asynchronous up counter. CO5
a) Design circuit diagram using T flip flop
b) Write truth table
c) Draw timing diagram
d) If the output frequency is 10 MHz what is the clock input frequency.

c i) Differentiate between synchronous and asynchronous sequential circuit. Also differentiate between critical and non-critical race. CO4

Or

ii. Differentiate Mealy and Moore circuit machine with neat diagram CO4

d i) Design Carry look ahead adder circuit with required derivation of different intermediate outputs. Also mention how it is better to parallel adder circuit. CO5

Or

ii) Design 'Asynchronous up/down counter' and explain its working. CO5

e i) Implement BCD to excess 3 code converter using PAL. CO3

Or

ii). What do you mean by Multiplexer give the circuit diagram of 8:1 MUX. Implement the following Boolean function using 8:1 MUX $F(A,B,C,D) = \sum m(0,1,3,4,8,9,15)$ CO3