



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

ASSIGNMENT

Course Name	:	SWITCHING THEORY AND LOGIC DESISN
Course Code	:	A40407
Class	:	II B. Tech II Sem
Branch	:	EEE
Year	:	2016 – 2017
Course Coordinator	:	Mr. S. Rambabu, Assistant Professor
Course Faculty	:	Mr. S. Rambabu, Assistant Professor

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
UNIT - I NUMBER SYSTEMS AND BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS SHORT ANSWER QUESTIONS			
1	Write short notes on binary number systems.	Remember	1
2	Discuss 1's and 2's complement methods of subtraction.	Understand	1
3	Discuss octal number system.	Understand	1
4	State and prove transposition theorem.	Remember	2
5	Show how do you convert AND logic to NAND logic?	Apply	3
6	Describe a short note on five bit bcd codes.	Remember	1
7	Illustrate about unit –distance code? State where they are used.	Apply	1

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
8	State about error correcting codes?	Remember	1
9	When do you say that a signal is asserted?	Understand	1
10	State about logic design and what do you mean by positive logic system?	Remember	2
(LONG ANSWER QUESTIONS)			
1	(a) Perform the subtraction with the following unsigned binary numbers by taking the 2's complement of the subtrahend: i. 100 – 110000 ii. 11010 - 1101. (b) Construct a table for 4 -3 -2 -1 weighted code and write 9154 using this code Write short notes on binary number systems.	Understand	1
2	(a) Perform arithmetic operation indicated below. Follow signed bit notation: i. 001110 + 110010 ii. 101011 - 100110. (b) Explain the importance of gray code	Understand	1
3	Find $(3250 - 72532)_{10}$ using 10's complement	Understand	1
4	As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. Green LED display turns on if all three gears are properly extended when the "gear down" switch has been activated in preparation for landing. Red LED display turns on if any of the gears fail to extend properly prior to landing. When a landing gear is extended, its sensor produces a LOW voltage. When a landing gear is retracted, its sensor produces a HIGH voltage. Implement a circuit to meet this requirement.	Apply	1
5	(a) Divide 01100100 by 00011001 (b) Given that $(292)_{10} = (1204)_b$ determine 'b'	Understand	1
6	(a) What is the gray code equivalent of the Hex Number 3A7 (b) Find the biquinary of number code for the decimal numbers from 0 to 9 (c) Find 9's complement $(25.639)_{10}$	Understand	1
7	(a) Find $(72532 - 03250)$ using 9's complement. (b) Show the weights of three different 4 bit self complementing codes whose only negative weight is - 4 and write down number system from 0 to 9.	Understand	1
8	Decimal system became popular because we have 10 fingers. A rich person On earth has decided to distribute Rs.one lakh equally to the following persons from various planets. Find out the amount each one of them will get in their respective currencies: A from planet VENUS possessing 8 fingers B from planet MARS possessing 6 fingers C from planet JUPITER possessing 14 fingers D from planet MOON possessing 16 fingers	Apply	1
9	State and prove any 4 Boolean theorems with examples	Remember	2
UNIT - II MINIMIZATION AND DESIGN OF COMBINATIONAL CIRCUITS SHORT ANSWER QUESTIONS			
1	Define K-map?	Remember	5
2	Write the block diagram of 2-4 and 3-8 decoders?	Understand	6

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
3	Define magnitude comparator?	Remember	6
4	What do you mean by look-ahead carry?	Remember	6
5	Simplify the Boolean function $x'yz + x'yz' + xy'z' + xy'z$ using K-map	Remember	5
6	How combinatorial circuits differ from sequential circuits?	Remember	6
7	What are the IC components used to design combinatorial circuits with MSI and LSI?	Understand	6
8	Define the importance of prime implications	Remember	5
9	Locate the minterms in a three variable map for $f = \sum m(0,1,5,7)$	Remember	5
10	Simplify the Boolean function $x'yz + x'yz' + xy'z' + xy'z$ without using K-map	Apply	5
(LONG ANSWER QUESTIONS)			
1	Reduce the expression using K-map $F = \sum m(0,1,2,4,5,8,10,12,14)$?	Apply	5
2	Reduce the expression using Tabular(quine mcCluskey) method $F = \sum m(0,1,6,7,8,13,14,15)$?	Apply	5
3	A combinational circuit has 4 inputs(A,B,C,D) and three outputs(X,Y,Z)XYZ represents a binary number whose value equals the number of 1's at the input i Find the minterm expansion for the X,Y,Z ii. Find the maxterm expansion for the Y and Z	Apply	5
4	A combinational circuit has four inputs (A,B,C,D), which represent a binary-coded-decimal digit. The circuit has two groups of four outputs - S,T,U,V (MSB digit) and W,X,Y,Z.(LSB digit)Each group represents a BCD digit. The output digits represent a decimal number which is five times the input number. Write down the minimum expression for all the outputs.	Apply	5 & 6
5.	Simplify the following Boolean expressions using K-map and implement them using NOR gates: (a) $F(A, B, C, D) = AB'C' + AC + A'CD'$ (b) $F(W, X, Y, Z) = W'X'Y'Z' + WXY'Z' + W'X'YZ + WXYZ.$	Understand	5
6	Design BCD to Gray code converter and realize using logic gates	Understand	6
7	Design 2*4 decoder using NAND gates	Understand	6
8	Reduce the following expression using Karnaugh map ($B'A + A'B + AB'$)	Understand	5
9	Design a circuit with three inputs(A,B,C) and two outputs(X,Y) where the outputs are the binary count of the number of "ON" (HIGH) inputs	Apply	6
10	A certain 4 input gate called LEMON gate realizes the switching function $LEMON(A,B,C,D) = BC(A+D)$. Assuming that the input variables are available in both primed and unprimed form: show a realization of the function $f(w,x,y,z) = \sum(0,1,6,9,10,11,14,15)$ with only three LEMON gates and one OR gate. Can all switching functions be realized with LEMON/OR logic	Apply	6

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11	Design a circuit with four inputs and one output where the output is 1 if the input is divisible by 3 or 7.	Apply	6
12	Implement Half adder using 4 NAND gates.	Apply	6
UNIT- III SEQUENTIAL MACHINES FUNDAMENTALS			
1	What do you mean a stable state?	Remember	7
2	What is a Flip-Flop?	Understand	7
3	What are the applications of Flip-Flops?	Remember	7
4	Express your view about synchronous latch?	Understand	7
5	How do you build a latch using universal gates?	Apply	7
6	What is the flip-flop memory characteristic?	Understand	7
7	Distinguish between synchronous and asynchronous latch?	Remember	7
8	What is meant by clocked flip-flop?	Remember	7
9	Why a gated D latch is called a transparent latch?	Remember	7
10	What are the two types of flip-flops?	Remember	7
11	Explain about Different types of Latches in detail	Remember	7
12	Explain about S-R (NOR gates) Latch?	Remember	7
13	Explain about S-R (NAND gates) Latch?	Remember	7
14	Draw The truth table of gated D-Latch?	Apply	7
15	Distinguish between Latch and Flip Flop?	Remember	7
16	Draw The block diagram of sequential circuit?	Apply	7
17	Determine the output state of S-R latch (active low) for $S=1, R=0, Q_n=1$	Apply	7
18	What is Asynchronous sequential Circuit?	Remember	7
19	Draw the gated S-R latch Logic Diagram?	Apply	7
20	Determine the output state of S-R latch (active low) for $S=0, R=0, Q_n=1$	Understand	7
21	What is binary cell?	Remember	7
22	Draw The gated D-Latch logic diagram?	Apply	7
23	Determine the output state of gated D-latch for $D=1, Q_n=0, enable=0$.		7
24	Draw the S-R Latch(NAND) Truth Table ?	Apply	7
25	Determine the output state of JK flip-flop for $J=1, K=1, Q_n=1$ when clock is inactive.	Understand	7

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
26	Determine the output state of JK flip-flop for J=0, K=1, $Q_n = 1$ when clock is active.	Understand	7
27	Determine the output state of S-R latch (active low) for S=0, R=1, $Q_n = 1$	Understand	7
28	Draw the S-R latch (NOR) Truth Table ?	Understand	7
(LONG ANSWER QUESTIONS)			
1	Analyze the clocked sequential circuits.	Understand	7
2	Examine with the help of a block diagram, the basic components of a Sequential Circuit?	Remember	7
3	Compare RS and JK flip-flops.	Understand	7
4	Describe about T – Flip-flop with the help of a logic diagram and characteristic table. Derive a T-flip-flop from JK and D flip-flops.	Understand	7
5	Define Latch. Explain about Different types of Latches in detail	Remember	7
6	Explain about all flip flops in detail with diagram	Remember	7
7	Derive the characteristic equations for all Flip-Flops.	Remember	7
8	Memorize about basic macro cell logic diagram and explain.	Remember	7
9	Differentiate combinational and sequential circuits	Understand	7
10	Explain the working principle of JK Flip-Flop in detail.	Understand	7
UNIT - IV SEQUENTIAL CIRCUIT DESIGN AND ANALYSIS SHORT ANSWER QUESTIONS			
1	What are Shift registers?	Remember	8
2	Distinguish between a shift register and counter?	Understand	8
3	What are the applications of shift registers?	Remember	8
4	Discuss about a bidirectional shift register?	Understand	8
5	Summarize about a dynamic shift register?	Understand	8
6	Describe about UART?	Understand	8
7	Classify of counters?	Understand	8
8	What are the advantages and disadvantages of ripple counters?	Remember	8
9	What do you mean by terminal count?	Remember	8
10	State variable modulus counter?	Remember	8
(LONG ANSWER QUESTIONS)			

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
1	Explain the design of Sequential circuit with an example. Show the state reduction, state assignment	Remember	8
2	Explain Serial Transfer in 4-bit shift Registers	Remember	8
3	Explain about Binary Ripple Counter	Understand	8
4	Define BCD Counter and Draw its State table for BCD Counter	Remember	8
5	Explain the state reduction and state assignment in designing sequential circuit. Consider one example in the above process	Understand	8
6	Design a sequential circuit with two D flip-ops A and B. and one input x. when $x=0$, the state of the circuit remains the same. When $x=1$, the circuit goes through the state transition from 00 to 11 to 11 to 10 back to 00. and repeats	Apply	8
7	Design a Modulo-12 up Synchronous counter Using T-Flip Flops and draw the Circuit diagram	Apply	8
8	Explain the Ripple counter design. Also a decade counter design	Remember	8
9	Write short notes on shift register? Mention its application	Remember	8
10	Design a left shift and right shift for the following data 10110101	Apply	8
UNIT - V SEQUENTIAL CIRCUITS & ALGORITHMIC STATE MACHINES SHORT ANSWER QUESTIONS			
1	What are the capabilities and limitations of FSM?	Understand	9
2	Demonstrate about successor?	Understand	9
3	Describe about terminal state?	Understand	9
4	Define a strongly connected machine?	Remember	9
5	List the advantage of having equivalent states?	Remember	9
6	State 'state equivalence theorem'.	Understand	9
7	Tell about distinguishing sequence?	Remember	9
8	Define state compatibility?	Understand	9
9	Describe a merger graph?	Understand	9
10	State FSM compatibles?	Remember	9
(LONG ANSWER QUESTIONS)			
1	Differentiate between Race free and Latch free design?	Understand	9
2	Draw the ASM chart to count the number of ones in a register?	Apply	9
3	Draw the ASM chart for a binary multiplier?	Apply	9

S. No	QUESTION	BLOOMS TAXONOMY LEVEL	COURSE OUTCOME
4	Explain the concept of ASM chart?	Understand	9
5	Obtain the primitive flow table for the circuit with two inputs, x1 and x2, and two outputs, z1 and z2, that satisfy the following four conditions: a. When $x_1x_2 = 00$, the output is $z_1z_2 = 00$. b. When $x_1 = 1$ and x_2 changes from 0 to 1, the output is $z_1z_2 = 01$. c. When $x_2 = 1$ and x_1 changes from 0 to 1, the output is $z_1z_2 = 10$. d. Otherwise the output does not change.	Apply	9
6	An asynchronous sequential circuit is described by the excitation function $Y = x_1x_2' + (x_1 + x_2')y$ and the output function $z = y$. a. Draw the logic diagram of the circuit. b. Derive the transition table and output map. c. Obtain a two state flow table.	Apply	9
7	Find the circuit that has no static hazards and implements the Boolean function $F(A, B, C, D) = \Sigma(0, 2, 6, 7, 8, 10, 12)$.	Apply	9
8	Draw the ASM chart for adding or subtracting the two signed magnitude numbers A and B?	Remember	9
9	Write the differences between Mealy and Moore type machines.	Understand	9
10	A sequential circuit has 2 inputs $w_1=w_2$ and an output z. Its function is to compare the i/p sequence on the two i/p's. If $w_1=w_2$ during any four consecutive clock cycles, the circuit produces $z=1$ otherwise $z=0$ $w_1 = 0110111000110$ $w_2 = 1110101000111$ $z = 0000100001110$	Apply	9

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