



Terminal Examination – Spring 2018

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Course Title:	Digital Logic and Design			Course Code:	EEE 241	Credit Hours: 4(3,1)
Course Instructors:	Aamna Arif, Wajeera Khan, Ramsha Bukhari, Ayesha Ali			Program Name:	BCS, BSE	
Semester:	3rd	Batch:	Repetitors	Section:	A,B	Date:
Time Allowed:	180 Minutes			Maximum Marks:	100	
Student's Name:				Reg:	CIIT/DDP-	

Important Instructions / Guidelines:

- All answers must be given on the answer books.
- The exam is closed book, closed notes.
- Mobile phones are not allowed in the examination room.
- There will be no negative marking.

Question No. 1:

[20 Marks]

Answer these following short questions

- (a) Determine the base b: $(361)_{10} = (551)_b$ [5 marks]
- (b) Multiply -7 and -9 using signed magnitude method [5 marks]
- (c) The state of a 12-bit register is 010110010111. What is its content if it represents [5 marks]
- Decimal digits in BCD code
 - Decimal digits in excess-3 code
 - Decimal digits in 8 4-2-1 code
 - Natural binary number
- (d) The result of an experiment fall in the range -4 to -6. A scientist wishes to read the result into a computer and then process them. He decides to use a 4-bit binary code to represents each of the possible inputs. Devise a 4-bit binary code of representing numbers in the range of -4 to 6 [5 marks]

Question No. 2:

[20 Marks]

- a) Design a circuit that takes three bits as an input and generates the 2's complement of the input using one 3-to-8 line decoder [10 Marks]
- b) Implement the circuit given in Fig. 1 using 4 to 1 Multiplexer [10 Marks]

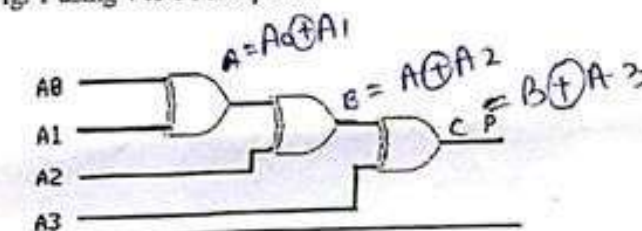


Fig. 1

Question No. 3:

[20 Marks]

Design a sequential circuit with one D flip flop, one T flip flop and two inputs E and X. If $E = 0$, the circuit remains in the same state, regardless of the value of X. When $E=1$ and $X=1$, the circuit goes through the state transitions from 00 to 01 to 10 to 11, back to 00, and then repeats. When $E = 1$ and $X = 0$, the circuit goes through state transitions from 00 to 11 to 10 to 01, back to 00 and then repeats.

Question No. 4:

[10+10=20 Marks]

- A. Draw the state diagram for a synchronous sequential circuit to detect a start of a message sequence of 111 and 1101. It outputs a 1 when the sequence 111 or 1101 is detected.
- B. Design the sequential circuit specified by the Fig. 2, you can use any type of flip flop.

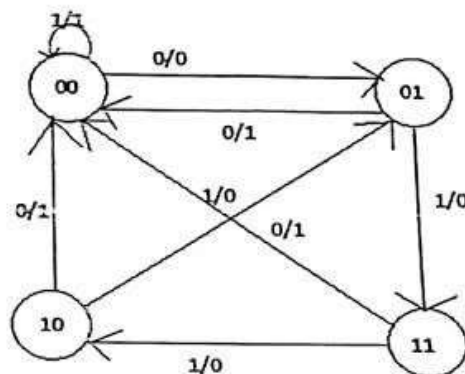


Fig. 2

Question No. 5:

[10+10=20 Marks]

- (a) Design a synchronous counter that counts through the sequence 2, 6, 1, 7, 5 and repeat.
- (b) Using this counter design, indicate what will happen if the counter accidentally enters one of the unused states in the state diagram?