

Course Code: EE1005	Course Name: Digital Logic Design (DLD)
Instructor Name / Names: Mr. Aamir , Mr Aashir , Mr. Behraj , Mr. Hamza, Ms. Rabia Tabassum, Ms. Rukhsar , Ms. Sumaiyah , Mr. Zakir	
Student Roll No: 21K-3158	Section No: BCS-2J

**Instructions:**

- ✓ Return the question paper.
- ✓ Read each question completely before answering it. There are **3 questions and 2 pages**.
- ✓ In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.
- ✓ All the answers must be solved according to the sequence given in the question paper.
- ✓ This paper is subjective.

**Time:** 60 minutes.

**Max Marks:** 45 points

**Question 1: ( Digital System ) [18]**

- a) For the digital waveform shown in Fig.-1, determine the duty cycle and frequency of the waveform in Fig.-1 [2]

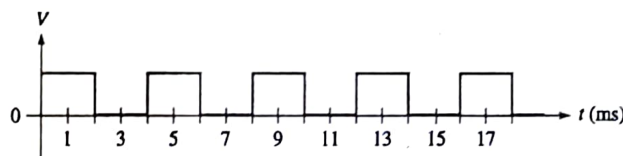


Fig-1

- b) Express the decimal number (-98) in binary as an 8-bit sign-magnitude number, the 1's complement form, and 2's complement form. [6]
- c) Perform the following 8-bit sign numbers operation: [2]  
 $10001100 + 00111001$
- d) Convert the following number in BCD [2]  
 (i)  $10110101_2$       (ii)  $567_{10}$
- e) Convert the following grey code in binary number (i)1011 (ii) 1100 [2]
- f) Solve the following operations in binary form: [4]  
 (i)  $1101_2 \times 1010_2$     (ii)  $1011_2 \div 11_2$

**Question 2: ( Logic Gates and Its Applications ) [7]**

- a) Your instructor teaches CS1005 to the students where some of them are registered and some of them are not, he asked you to design a logic diagram which will be used for checking if the student is allowed to sit in exam or not based on following scenario:  
 If the student is registered and his/her attendance is 80% then the student is allowed to sit in exam otherwise not.  
 The attendance of the student below 80% is represented by LOW signal and above 80% by HIGH signal.

Before drawing the logic diagram, you must write down the truth table and logic expression from the table as well. Your logic circuit will be connected to a RED light which will remain off if the student is allowed to sit in exam otherwise ON. [4]

- b) Determine the output waveform in Fig-2 and draw the timing diagram with respect to given number (1 to 16) in answer sheet. [3]

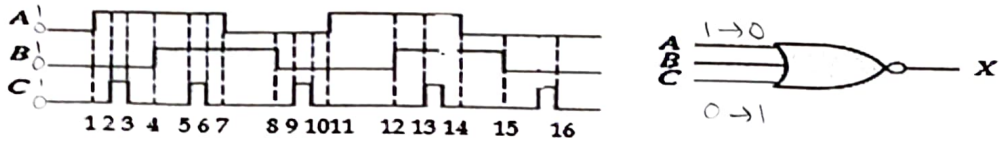


Fig-2

**Question 3: (Boolean Algebra ) [20]**

- a) Apply DeMorgan's theorems to the expression and simplify it. [4]

$$\overline{\overline{A + BC} + (\overline{A + C})D + \overline{AB}}$$

- b) Simplify it using Boolean algebra. Also develop the truth table. [6]

$$\overline{AC}(\overline{ABD}) + \overline{AB}(\overline{C + D}) + A\overline{B}C$$

- c) Write the standard SOP and POS forms of the logic expression for the following circuits (Fig-3). [4]

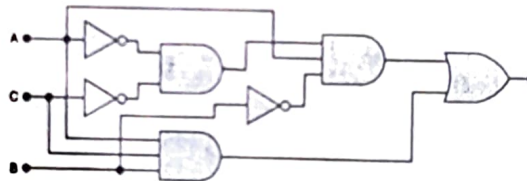


Fig-3

- d) Use a Karnaugh map to simplify (in SOP form) the given Boolean functions. Implement the simplified form into circuit. [6]

$$F(A, B, C, D) = \prod (0, 1, 2, 5, 7, 13, 15)$$

**BEST OF LUCK!**