

- Q.25 Draw the truth table and explain the working of full subtractor
- Q.26 Explain De morgan's first theorem.
- Q.27 List five characteristics of CMOS logic family
- Q.28 Differentiate between a latch and a flip flop
- Q.29 Subtract 1001 from 1010 using 1's complement method of binary subtraction.
- Q.30 Explain the working of a 2-bit comparator.
- Q.31 Minimize using K-Map  $Y = \sum m(0,2,3,5,6,7)$
- Q.32 Explain the working of Dual slope A/D converter
- Q.33 Explain the working of weighted resistor DAC
- Q.34 Explain the working of universal shift register.
- Q.35 Explain the working of an Encoder.

#### SECTION-D

**Note:** Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

- Q.36 Simplify using K-map and realize using only NAND gate

$$Y = \sum m(0,1,5,6,9,10,14) + d(4,7,8,11,15)$$

- Q.37 Design a 3 bit binary up counter.
- Q.38 Draw the truth table and explain the working of full adder.

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#### 4th Sem / Mechatronics Subject:- Digital Electronics

Time : 3Hrs.

M.M. : 100

#### SECTION-A

**Note:** Multiple choice questions. All questions are compulsory (10x1=10)

- Q.1 What is the binary equivalent of the decimal number 14?  
a) 1110                                      b) 1010  
c) 1101                                      d) 1001
- Q.2 What is the value of the Boolean expression  $A + \bar{A}$ ?  
a) 1    b) 0  
c) A    d)  $\bar{A}$
- Q.3 Output of SR flip flop when both the inputs are one is \_\_\_\_\_  
a) 0    b) 1  
c) Not defined                              d) Toggle
- Q.4 A 3-input OR gate will give an output of 0 When:  
a) All three inputs are 0  
b) At least one inputs is 0  
c) All three inputs are 1  
d) At least one input is 1

- Q.5 Number of inputs in a half adder is \_\_\_\_\_  
 a) 1                                      b) 2  
 c) 3                                      d) 4
- Q.6 What is the minimum number of inputs an AND gate can have?  
 a) 1                                      b) 2  
 c) 3                                      d) 0
- Q.7 What is the primary purpose of a flip-flop in digital circuits?  
 a) Amplify the signal  
 b) Store binary data  
 c) Convert analog signals to digital  
 d) Perform arithmetic operations
- Q.8 A decade counter has \_\_\_\_\_ states  
 a) 4                                      b) 10  
 c) 16                                      d) 32
- Q.9 The race-around condition occurs in which type of flip-flop?  
 a) D flip-flop                      b) T flip-flop  
 c) JK flip-flop                      d) SR flip-flop
- Q.10 What is the main disadvantages of a binary - weighted DAC?  
 a) It uses too many op-amps  
 b) It is very slow  
 c) It requires wide range of precise resistors  
 d) It cannot be used in microcontrollers

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## SECTION-B

**Note:** Objective type questions. All questions are compulsory. (10x1=10)

- Q.11 The basic building block of sequential circuits is the \_\_\_\_\_.
- Q.12 The base of the binary number system is \_\_\_\_\_
- Q.13 Expand CMOS.
- Q.14 Output of JK flip flop when both the inputs are zero is \_\_\_\_\_
- Q.15 A flip-flop stores \_\_\_\_\_ bit of data.
- Q.16 Number of flip flop required to construct a MOD-8 binary up counter is \_\_\_\_\_
- Q.17 A NAND gate is a combination of an AND gate followed by a \_\_\_\_\_ gate.
- Q.18 A NOT gate has \_\_\_\_\_ inputs
- Q.19 Number of select lines in 8:1 MUX is \_\_\_\_\_.
- Q.20 Full form of SOP is \_\_\_\_\_

## SECTION-C

**Note:** Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

- Q.21 List five applications of digital signals.
- Q.22 Explain error detection and correction using parity.
- Q.23 Minimize using boolean algebra  $\bar{A}\bar{B}C + \bar{A}BC + A\bar{B}\bar{C} + ABC$
- Q.24 Convert  $(ABC)_{16}$  into decimal and binary number.

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