

Code No: 183AP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, February - 2024

DIGITAL ELECTRONICS
(Artificial Intelligence and Data Science)

Time: 3 Hours

Max. Marks: 60

Note: This question paper contains two parts A and B.i) **Part- A** for 10 marks, ii) **Part - B** for 50 marks.

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of **ten questions** (numbered from 2 to 11) **carrying 10 marks each**. From each unit, there are two questions and the student should answer one of them. Hence, the student should answer five questions from Part-B.

PART- A**(10 Marks)**

- 1.a) Given that $(292)_{10} = (1204)_b$, determine the value of b. [1]
- b) State the Commutative law. [1]
- c) What is the use of don't care combinations? [1]
- d) Derive the sum of min terms for the function $f(a,b,c)=a'b+b'c'$. [1]
- e) What is the difference between a Decoder and a De multiplexer? [1]
- f) Draw the logic circuit of a full adder and give its truth table. [1]
- g) Show the excitation table of the JK flip flop. [1]
- h) Differentiate a latch and a flip-flop. [1]
- i) What is mean by memory decoding? [1]
- j) Differentiate between RAM and ROM. [1]

PART - B**(50 Marks)**

- 2.a) Simplify the following Boolean expressions to a minimum number of literals
(i) $ABC+A'B+ABC'$ (ii) $xy + x(wz+wz')$
- b) Using 2's complement perform $(42)_{10} - (68)_{10}$. [5+5]
- OR**
- 3.a) Write the truth table and symbols of AND, OR and NOT gates.
- b) Convert $(BD98.0AC)_{16}$ to decimal, binary and octal. [5+5]
- 4.a) Simplify the expression $Y = \pi(7, 9, 10, 11, 12, 13, 14, 15)$ using the k-map method.
- b) Simplify the following Boolean expression using K- map and implement them with NOR logic gates $F(A,B,C,D) = \sum m(1,3,7,11,15) + d(0,2,5)$. [4+6]
- OR**
- 5.a) Minimize the following expressions using K-map and realize using NAND Gates.
 $f = \sum m(0,1,4,5,6,7,9,11,15) + d(10,14)$
- b) Simplify using Boolean postulates and verify using K-map the following
 $(x + y' + xy')(xy + x'z + yz)$ [6+4]

QA QA QA QA QA QA QA G

- 6.a) Explain the differences between a MUX and a DEMUX.
b) Draw the logic diagram of an 8-line to 1-line multiplexer and explain its working. [4+6]

OR

- 7.a) Explain the operation of 3 to 8 line decoder with the help of a truth table.
b) Compare between serial and parallel Adder. [6+4]

- 8.a) Explain the operation of R-S master slave flip flop. Explain its truth table.
b) Explain about the realization of SR flip-flop, JK flip-flop using D flip-flop. [5+5]

OR

- 9.a) Design and explain the operation of a decade Johnson counter.
b) What do you mean by universal shift register? Draw and explain its circuit diagram and operation. [5+5]

- 10.a) Explain about RAM in detail.
b) Implement the following Boolean functions using PLA with 3 AND gates.
 $F1(ABC) = \sum(3, 5, 7), F2 = \sum(4, 5, 7)$ [5+5]

OR

- 11.a) What are sequential programmable devices? Draw the sequential programmable logic for basic microcell logic.
b) Explain briefly about logic construction of 32×4 ROM. Draw and explain the relevant logic diagram. [5+5]

QA QA QA QA QA QA QA G
---ooOoo---

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G

QA QA QA QA QA QA QA G