

Code No: 153AN

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year I Semester Examinations, March - 2021

DIGITAL SYSTEM DESIGN

(Electronics and Communication Engineering)

Time: 3 Hours

Max. Marks: 75

**Answer any five questions
All questions carry equal marks**

- 1.a) Convert the following to Decimal and then to octal.
i) $(125F)_{16}$
ii) $(10111111)_2$
iii) $(4234)_5$.
- b) How do you convert a gray number to binary? Generate a 4-bit gray code directly using the mirror image property. [7+8]
- 2.a) Find all the prime implicants of the function using Quine McClusky method
 $f(a,b,c,d) = \Sigma(7,9,12,13,14,15) + d(4,11)$.
- b) Design a circuit that converts 8421 BCD code to XS-3 code. [8+7]
- 3.a) With a neat circuit diagram and waveforms explain the operation of Master Slave JK flip flop.
- b) Explain the conversion of SR flip flop into JK and D flip flop with an excitation table. [8+7]
- 4.a) What are the capabilities and limitations of finite state machines? Explain.
- b) Draw the diagram of Mealy type FSM for serial adder. [8+7]
- 5.a) Describe the operation of TTL logic circuit working as NAND gate.
- b) Realize 2-input OR gates using CMOS logic and then explain its operation with the help of functional table. [7+8]
- 6.a) Convert the following expression into SOP and POS:
i) $(AB+C)(B+C'D)$
ii) $x+(x+y)(y+z)$
- b) Implement the switching function using $F = \Sigma m(0,1,3,4,12,14,15)$ using an 8 input MUX. [8+7]
- 7.a) Design a 3-bit synchronous counter with T-flip flop and draw the diagram.
- b) Discuss the differences between combinational and sequential circuit. [9+6]
- 8.a) Mention the characteristics of different logic families. Also compare the performance of TTL, CMOS and ECL logic.
- b) Design a synchronous sequential circuit which goes through the following states:
1, 3, 5, 3, 6, 1, 3, 5. [8+7]