

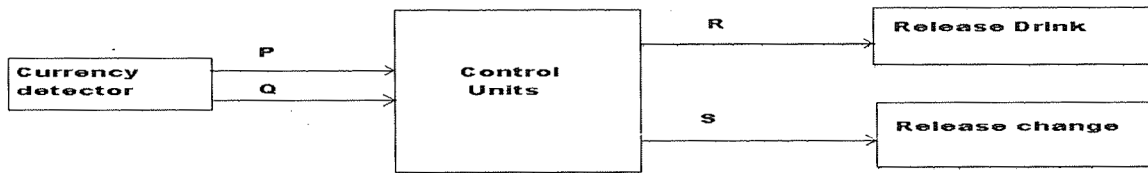
Q.1. State and explain five characteristics of Digital ICs. What is a multiplexer? Compare electronic multiplexer and mechanical multiplexer. Obtain a 3x1 MUX from a 4x1 MUX. Construct a parallel-to-serial converter using the MUX. What is a DEMUX? Construct a 6x64 DEMUX using 4x16 DEMUXes. What is a Decoder? What do you mean by active-low and high output type Decoder? Explain them with necessary diagram. Realize a full adder using both type of decoders and Multiplexer. 20Marks

Q2. a. Define an asynchronous sequential logic circuits (ASLCs) and fundamental-mode circuits. Explain pulse-mode operation of ASLCs. b. Define the following terms:

- i. Input states
- ii. Secondary (internal) states
- iii. Excitation variables
- iv. Total state
- v. Stable state : 8Marks

b) Design a control unit for a simple coin-operated cold drink vending machine. The drink costs Rs. 15, and the machine accepts currency of Rs 5 and Rs 10. Change should be returned if more than Rs 15 is deposited. No more than Rs 20 can be deposited on a single purchase. 6Marks

Give all steps including state diagram



c. Distinguish (in tabular form) between (i) SSLC and ASLC, (ii) Moore and Mealy Machine, (iii) Don't care and forbidden conditions. 6Marks

Q3a . Analyze the logic circuit shown in the figure B : 5marks

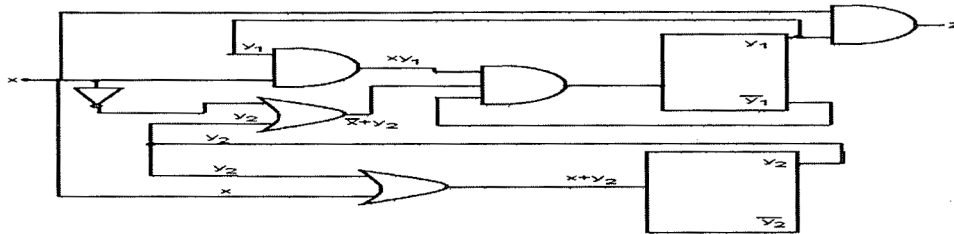


Fig. B

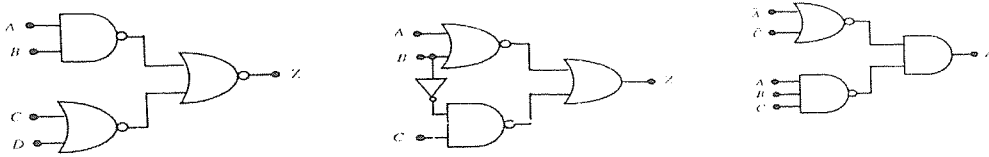
b. Explain how hazards can occur in Digital Circuits. give their classifications with one example for each with diagram. How will you prevent hazards? What is a function hazard? Explain with suitable diagram 7Marks

c. What are races? Explain critical and non-critical races with suitable examples .4Marks

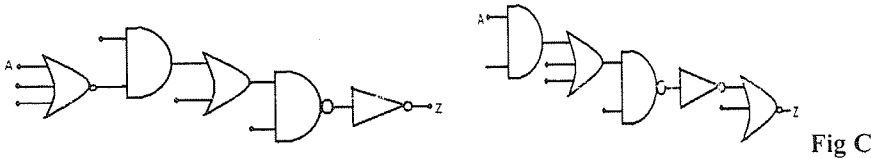
d. What are cycles? Explain these terms by quoting appropriate examples 4Marks

Q4. (a) What are preset experiments? (b) what is fault dictionary? (c) Discuss the Boolean difference method with suitable examples. What are the properties of Boolean differences? Verify all of them ( at least 5 features) .[ 1 +1 + 6 =8Marks]

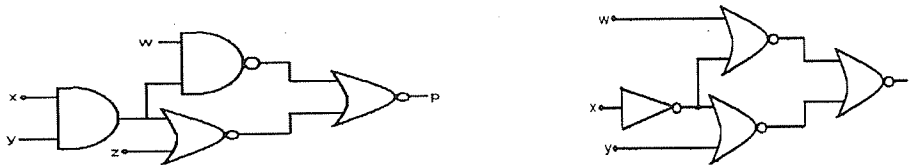
(d) Obtain the test faults in the following circuits using Boolean difference method. 6marks



(e). Explain the path sensitizing method .What is the advantages and disadvantages of the path sensitizing method? Use the path - sensitizing method for the following circuit ( Fig C) . 6Marks



Q5.(a) Discuss the SPOOF method of fault detection. Use the SPOOF method in finding the tests required for the circuit shown



(b) Discuss the steps involved in the design of an SSLC. Illustrate your explanation by using suitable example.

(c ) Design a circuit that takes as input a serial bit stream and outputs a ‘1’ whenever the sequence “111” occurs. Overlaps must also be considered, that is, if the input sequence is “...0111110...”, for example, then the output sequence should be “...0001110...”. Analyze whether the proposed solution is subject to glitches or not. [ 6+7+7=20 Marks]

Q6. (a) State and explain Booth’s Algorithm using following multiplication schemes (i) (-12x -11) and (ii) (-12x11). Establish its fastness.

(b) Explain restoring and non-restoring Division algorithms with one example for each

(c) Explain the needs of IEEE754 standard. Convert decimal 202.625 into IEEE 754 format. [ 10+6+4 = 20marks]

Q7. (a) Explain the following with necessary sketches:(i) Programmable array logic (PAL) (ii) Programmable logic array (PLA) (iii)Field programmable gate array (FPGA)

(b)Implement the following using PLAs: (i)  $AC'+ACB'+ABCD$  (ii)  $A+B+CD+AD$

(c) Explain AHDL . Compare in tabular form the performance of (i) VHDL and Verilog . [ 9+6 + 5=20 marks]

Q8(a) Why do we need memory? Give various classification of Memory. What are ROM and RAM? Compare these two memories. (b). Give a few examples of a ROM and discuss their various types. (C). Draw the structure of decimal-to-binary diode matrix encoder. (d). Draw the structure of a 4096-bit ROM.

(e) . Explain the following: (i) Mask-programmable ROM? (ii) Field-programmable ROM? (iii) Erasable-programmable ROM? [ 6.5+ 3+ 4+ 2 + 4.5 = 20 marks]