Reg. No. :

Question Paper Code : P 1431

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2009.

Third Semester

Mechatronics Engineering

MH 1201 — DIGITAL ELECTRONICS

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the 9's and 10's complement of 546700.

2. Determine the complement of the function $F = A(B'C' + BC)$.

3. Give the expressions for difference and borrow of Half subtractor. Draw the logic circuit.

4. State the difference between decoder and demultiplexer.

5. Give the excitation table of JK Flip flop.

6. What is a ripple counter?

7. What is a hazard?

8. What is a race condition?

9. Define algorithmic state machine.

10. What are the basic blocks of ASM chart?

11. (a) Perform the following :

(i) $(16.5)_{16} = (\quad)_{10}$. (4)

(ii) 2's complement of 100000. (4)

(iii) Simplify the expression to minimum number of literals $(xyz + x'y + xyz')$. (4)

(iv) Draw a NAND logic diagram that implements the complement of the following function $F(A,B,C,D) = \Sigma(0,1,2,3,4,8,9,12)$. (4) 15.

Or

(b) (i) Using Karnaugh map, simplify and draw logic circuit $F(w,x,y,z) = \Sigma(0,2,4,5,6,15) + d(7,8,10,13)$. (8)

(ii) Draw the multi level NOR implementation of $F = wx' + y'z' + w'y'z'$. (8)

12. (a) (i) Design a 4 bit gray code to binary converter implement using ex-OR gates. (8)

(ii) Design and draw the circuit of a full adder. (8)

Or

(b) (i) Using a decoder and external gates, design a combinational circuit defined by the three Boolean functions

$F_1(A,B,C,) = \Sigma(2,4,8)$

$F_2(A,B,C) = \Sigma(0, 3)$

$F_3(A,B,C) = \Sigma(0,2,5,7)$. (8)

(ii) Realize the above in a PLA. (8)

13. (a) Draw the logic circuit of a

(i) 4 bit ripple counter. (8)

(ii) 4 bit Johnson counter

and explain. (8)

Or

(b) Discuss elaborately on the different types of semiconductor memories and their characteristics. (16)

14. (a) (i) Why is the design of asynchronous sequential circuit different from that of synchronous circuits? (4)

(ii) With an example enumerate the procedure for analysing asynchronous sequential circuits. (12)

Or

(b) Explain the various types of Hazards present in combinational and sequential circuit with examples. (16)

15. (a) (i) Write a note on pulse mode sequential circuits. (6)

(ii) Draw the ASM chart to count the number of ones in a register. Also implement using multiplexer and other logic. (10)

Or

(b) Explain the difference between ASM chart and conventional flow chart. Draw the chart for the state diagram shown. (16)