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BT-3/D-20 **43133**

DIGITAL ELECTRONICS

ES-207A/ES-205A

Time : Three Hours] [Maximum Marks : 75

Note : All questions in Part A and Part B are compulsory. Attempt any *four* questions from Part C, selecting *one* question from each Unit.

Part A

1. Answer the following questions : **5×3=15**

(i) Explain the working of AND operation using NOR gate.

(ii) What is a BCD code ? What are its advantages and disadvantages ? Express the following numbers into BCD 874, 347.

(iii) Explain designing and working of half subtractor.

(iv) State the difference between positive edge triggering, negative edge triggering and level triggering of flip-flops.

(v) Write down the specifications of D/A converters.

Part B

2. Write the significance of gray code. Design a 4 bit gray to binary code converter. Express 27 in gray code. **5**

3. What is a demultiplexer ? Explain the working of $1 : n$ demultiplexer using logic diagram. **5**

4. Differentiate between a flip-flop and a Latch. Explain the working of J-K flip-flop. Also explain the problem associated with JK flip-flop. **5**

5. Draw the basic circuit of a ROM cell. Explain its working. **5**

Part C

Unit I

6. Explain the steps of minimization in Q-M method. Using Q-M method, obtain the minimal expression for $F = \Sigma m (6, 7, 8, 9, 13, 15) + d (10, 11, 12, 14)$. Also realize the expression using NAND gate only. **10**

7. (a) Write in detail the characteristics of digital logic gates. Explain them.

(b) Explain working of CMOS NAND gate. **10**

Unit II

8. (a) State and explain the working of BCD adder with its logic diagram. **6**

(b) What is encoder ? Design a 8 : 3 encoder. **4**

9. What do you mean by multiplexer ? Explain the working of $n : 1$ mux. Design a multiplexer tree for 32 : 1 mux using 8 : 1 and 2 : 1 mux. **10**

Unit III

10. (a) Design a mod 10 asynchronous counter.

(b) Design a synchronous mod-6 counter. Use JK flip-flop for designing the counter. **10**

11. (a) What do you mean by register ? Draw and explain the logic diagram of serial in serial out shift right register.

(b) Explain, how SR flip-flop can be converted into JK flip-flop ? **10**

Unit IV

12. What are different types of memories ? Explain them. **10**

13. What do you mean by PLD ? Discuss different types of PLD. Implement the following Boolean functions using PLA :

$f_1 (A, B, C) = \Sigma m (1, 2, 4, 6)$, $f_2 (A, B, C) = \Sigma m(0, 1, 5, 7)$, $f_3 (A, B, C) = \Sigma m (1, 2, 3, 5, 7)$. **10**