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BT-4/M-20 **34005**

DIGITAL ELECTRONICS
ECE-204-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Perform the following operations :

(i) $(27)_2 + (53)_2$

(ii) $(34 - 48)_2$

using 2's complement. **8**

(b) Explain the minimization technique using K-map. Obtain SOP expression for the function using K-map :

$f = \sum(0, 1, 4, 7, 13, 14) + d(5, 8, 15)$

Realise the obtained expression using NAND logic. **12**

2. (a) State De-Morgan's theorem. Explain the conversion of AND operation into OR operation with the help of De-Morgan's theorem. **6**

(b) Write the significance of gray code. Design a 4-bit gray to binary code converter. Express 27 in gray code. **7**

(c) What is a BCD code ? What are its advantages and disadvantages ? Express the following numbers into BCD : 874, 347, 658, 492. **7**

Unit II

3. (a) What do you mean by multiplexer ? Explain the working of n : 1 mux. Design a multiplexer tree for 32 : 1 mux using 16 : 1 and 2 : 1 mux. **10**

(b) Write down the steps to design a clocked sequential circuit. Design an asynchronous mode-10 counter. Use JK flip-flop for designing the counter. **10**

4. (a) What is flip-flop ? Explain its application as a register. Draw and explain the logic diagram of bidirectional shift register. **10**

(b) Draw and explain logical diagram for a full adder. Design a full adder using two half adders. **10**

Unit III

5. (a) Explain the different properties of logic families in detail. **10**

(b) Describe the working of TTL NAND gate. Explain tri state condition of TTL. **10**

6. (a) Draw and explain the working of a CMOS NAND gate. **10**

(b) Explain the interfacing of CMOS with TTL logic families. State the technical details kept in mind during interfacing. **10**

Unit IV

7. (a) Draw a neat and clean diagram of R-2R D/A converter. Explain its working. **10**

(b) Explain the working of successive approximation type A/D converter. **10**

8. (a) What is ROM ? Draw the block diagram showing memory organization in ROM. Explain different types of ROM. **10**

(b) Draw the structure of unprogrammed PAL ? How is it different from PLA ? **10**