DIGITAL ELECTRONICS

BRANCH :- ECE

These Questions are made for your previous exam, from PYQ and some internet….(Notes reference le Lena ek baar)

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🎯 "Previous year question paper jarur padh lena — pattern aur priority dono clear ho jaayega."

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🔷 UNIT 1: Number Systems and Codes

1. Explain the difference between analog and digital signals with real-world examples.
2. Convert the decimal number 187 to Binary, Octal, and Hexadecimal with all steps shown.
3. Define and explain 1's & 2's complement of binary numbers. Show subtraction using 2's complement.
4. Explain various binary codes: BCD, Gray, Excess-3, ASCII, and EBCDIC with suitable examples.
5. Perform BCD addition and explain conversion between:
   - BCD ↔ Decimal
   - Binary ↔ Gray
   - Decimal ↔ Excess-3

🔷 UNIT 2: Basic Logic Circuits

6. Draw symbols and truth tables of OR, AND, NOT, NAND, NOR gates.
7. Realize AND, OR, NOT gates using only NAND and NOR gates.
8. Simplify the Boolean Expression:
   (A +C + D)(A +C+ D')(A + C+ D)(A + B') using Boolean laws.
9. State and prove DeMorgan's Theorems with suitable examples.
10. Convert given truth table to SOP and POS forms (up to 4 variables).
11. Use Karnaugh Map (K-Map) to minimize the expression:
    f(A,B,C,D) = Σ(0,1,2,5,8,9,10)

UNIT 3: Arithmetic Circuits

12. Define Half Adder (HA) – draw truth table, derive Sum & Carry expressions, and implement using gates.
13. Define Full Adder (FA) with truth table, logic expression, and circuit diagram.
14. Explain working of a 3-bit parallel adder. How is carry handled across adders?
15. Define Half Subtractor (HS). Explain with logic and circuit.
16. Differentiate between Serial and Parallel Adders.
17. Write a short note on 2-bit Magnitude Comparator – explain working with logic and circuit.

UNIT 4: Multiplexers and Demultiplexers

18. Draw the logic diagram of a 4:1 multiplexer. Explain its working and write truth table and expression.
19. Draw and explain working of a 1:4 demultiplexer. Show its truth table and logical function.
20. Design an 8:1 multiplexer using two 4:1 MUX. Show connections and logic.
21. Implement logic function F = A'B + AC using 4:1 MUX.

UNIT 5: Encoders and Decoders

22. Explain Decimal-to-BCD encoder – logic diagram, truth table, and its real-life application.
23. Explain BCD-to-Decimal decoder with diagram, logic explanation, and truth table.
24. Write a short note on BCD to Seven-Segment Display decoder.

UNIT 6: Logic Families

25. What is propagation delay? Why is it important in digital circuits?
26. Write short notes on:
    a) Propagation Delay
    b) Fan-out
    c) Fan-in
27. Compare TTL, CMOS, and ECL logic families in terms of:

- Speed
- Power Dissipation
- Noise Margin
- Fan-in/Fan-out

28. Explain the need for interfacing between TTL and CMOS. What precautions must be taken?

☑ Ready for Exam Tips

- Har unit se at least 1 diagram + truth table ya logic expression aata hi hai.
- Diagram ke saath implementation logic likhna bohot important hai.
- Gate-level circuit banana aur K-map simplify karna 100% aana chahiye.

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