

2026

Physics (Core)

Paper Code : PY-CE-6344

Paper Name : Digital Electronics

Time : 2 hours

Full Marks : 50

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×4=4
 - a) Give one application of ULSI IC.
 - b) Represent the decimal number 9 using 8421 BCD.
 - c) Name the logic operation related to minterm and maxterm.
 - d) Write the basic difference between RAM and ROM.
2. Answer the following questions : 2×3=6
 - a) Why are Integrated Circuits preferred over discrete circuits ?
(mention any two reasons)
 - b) What is the function of a parity checker ? Which gate can be used as a basic parity checker ?
 - c) What is race around condition in JK flip-flop ? How this condition can be eliminated ?
3. Answer the following questions (any two) : 5×2=10
 - a) Write the truth table for the standard SOP expression $Y = \overline{A}BC + A\overline{B}C + AB\overline{C}$. Simplify this expression using a Karnaugh map. 1+4=5
 - b) Draw block diagram of a computer, clearly labelling the different units. Name the two memory addressing modes. Define cache memory. 3+1+1=5

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- c) Define T-type flip-flop ? Explain how these types of flip-flops are used to construct a divide-by-4 frequency divider. $1+4=5$
- d) Define clock pulse. Differentiate between level triggered and edge triggered clock pulse. Explain briefly the race-around condition. $1+2+2=5$
4. Answer the following questions (*any three*) : $10 \times 3 = 30$
- a) Define a shift register. Draw the block diagram of a SISO shift register to transfer a four-bit data (1010). Represent the shifting of the data with the help of a timing diagram. $1+4+5=10$
- b) With a necessary pin diagram, explain the working of a 555 timer as an astable multivibrator. $5+5=10$
- c) Define half and full adder ? Write their truth tables. What are the functions of carry bit in the half and full adder ? $2+2+4+2=10$
- d) Write short notes on :
(i) Master Slave JK Flip-Flop and (ii) Logic gates. $5+5=10$
- e) Write two differences between combinational and sequential logic. Draw a circuit for each of the logic circuits. $2+5+1\frac{1}{2}+1\frac{1}{2}=10$
- f) i) Differentiate between asynchronous and synchronous counters.
ii) What is meant by modulus of a counter (MOD number) ?
iii) Draw the logic diagram of a 4-bit asynchronous up counter using JK flip-flops and explain its operation with truth table and a neat timing out-put waveform. $2+1+7=10$

