Graphic Era
HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act 1956

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: Diploma (Third Semester)
Name of the Paper: Digital Logic
Paper Code: DTCS -302
Time: 3 hour Maximum Marks: 100

Note:
(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. CO1 (2X10=20 Marks)

a. Perform the following
i) $(10111.101)_2 = (?)_8$
ii) $(1D.E)_{16} = (?)_8$
iii) $(10111.1000)_2 = (?)_{16}$
iv) $(73.625)_{10} = (?)_8$

b. Define digital signal and digital systems? List any two advantages and disadvantages of digital systems.

c. What are Universal gates? Explain all universal gates with logic diagram and truth table.

Q2. CO2 (2X10=20 Marks)

a. What is Boolean algebra? Explain any four laws of boolean algebra.

b. Simply the following Boolean expression using Boolean algebra
i) ABC+A'B +ABC'
ii) Y'X' + XY +X'Y
iii) XY+XYZ+XYZ'+X'YZ
iv) (A+B) (A+B')

c. Implement F=AB+A'C using i) Basic Gates ii) NAND Gates iii)NOR Gates

Q3. CO3 (2X10=20 Marks)

a. Minimize the following expression using K-map.
$f(P, Q, R, S) = \Sigma m (2,4,5,9,10,12,13)$.

b. Compare Combinational and Sequential circuits. Design and draw a Half Adder circuit with its truth table and K-map simplification.

c. What are multiplexer and demultiplexer. Draw the logic circuit and truth table of a 4:1 multiplexer.

Q4. CO4 (2X10=20 Marks)

a. Discuss about counters . Design a Mod-8 asynchronous counter.

b. What is flip-flop? Explain how the invalid state is avoided in D flip-flop .

c. What are the different types of flip-flop? Derive the characteristic table and equation of JK and T flip flop

Q5. CO5 (2X10=20 Marks)

a. Discuss the following

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i) RAM and ROM
ii) EPROM and EEPROM

b. What is a Data Converter? Compare R-2R Ladder DAC and Weighted Resistor DAC in terms of design and accuracy.

c. What is memory in a digital system?Discuss memory hierarchy in detail.