

Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, May 2023			
Course: Digital Electronics Program: B. Tech- Electrical Engineering Course Code: ECEG-2016		Semester: IV Time : 03 hrs. Max. Marks: 100	
Instructions: Attempt all the sections.			
SECTION A (5Qx4M=20Marks)			
S. No.	Attempt all the questions.	Marks	CO
Q 1	Simplify the following $Y=(A+B)\overline{AB}$ and construct the logic diagrams using NAND gates.	4	CO1
Q2	Reduce the following function using K-map and identify the prime implicants and non- prime implicants in Product of Sum (POS) form. $f = \sum m(2, 3, 6, 7, 10, 11, 12)$	4	CO2
Q3	How combinational circuit and sequential logic circuit is different from each other? What are the real-world applications and necessity in human life of both type circuits?	4	CO3
Q4	Determine the resolution of (a) a 6-bit DAC and that of (b) a 12-bit DAC in terms of percentage.	4	CO4
Q5	A certain memory has a capacity of $8K \times 16$. (a) How many data input and data output lines does it have? (b) How many address lines does it have?	4	CO5
SECTION B (4Qx10M= 40 Marks)			
Q 6	Differentiate between a prime implicants and no-prime implicants. Also, minimize the following multiple output functions using K-map: $f_1(A, B, C, D) = \sum m(1, 2, 3, 5, 7, 8, 9) + d(12, 14)$ $f_2(A, B, C, D) = \sum m(0, 1, 3, 4, 6, 8, 9) + d(10, 11)$ $f_3(A, B, C, D) = \sum m(1, 3, 5, 7, 8, 9, 12, 13) + d(14, 15)$	2+8	CO1
Q7	Obtain the minimal expression for $f = \sum m(1, 2, 3, 5, 6, 7, 8, 9, 12, 13, 15)$ using the Tabular (Quine- Mc-Cluskey) method.	8+2	CO2
Q8	Design and analyze the operation of 8-4-2-1 binary coded decimal (BCD) to 7-segment decoder.	10	CO3

Q9	The 2125A is a static RAM IC that has a circuitry of 1Kx1, one active-LOW chip select, and separate data input and output. Show how to combine several 2125A ICs to form a 1Kx8 module.	10	CO5
SECTION-C (2Qx20M=40 Marks)			
Q 10	Design and analyze the 3-bit Gray code counter using the T-flip flop. Implement the state diagram and logic diagram (using basic logic gates and flip-flops) to understand the operation. Write the suitable application of it also. OR Implement a 3-bit ripple counter using D flip-flops. Also, draw and analyze timing diagram considering the propagation delay (no skipping states)	20	CO4
Q11	Attempt all the parts: (a) Elucidate the (i) dynamic and static memory (ii) Magnetic memory (b) It is desired to combine several 1Kx8 PROMs to produce a total capacity of 4Kx8. How many Chips are required? Design and analyze the arrangement.	6+14	CO5