Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S3 (S,FE) Examination December 2025 (2019 Scheme)

Course Code: MRT203

Course Name: ANALOG AND DIGITAL ELECTRONICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1	Explain the three regions of operation of MOSFET.	(3)
2	Mention the essential conditions satisfied by an oscillator circuit.	(3)
3	Why does an OP AMP has high CMRR?	(3)
4	What are the problems in an ordinary OP AMP differentiator? How can you eliminate this problem in practical differentiator?	(3)
5	Define Lock range and Capture range.	(3)
6	How does a band stop filter works?	(3)
7	Minimize the following function using K map $f=\sum m(0,2,6,10,11,12,13)+d(3,4,5,14,15)$	(3)
8	State and prove De Morgan's theorem.	(3)
9	Compare synchronous counter with asynchronous counter	(3)
10	With logic diagram and truth table explain the working of JK flipflop.	(3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11	With a neat sketch explain the working of RC phase shift oscillator and derive the expression for frequency of oscillation.	(14)
12	Describe the construction and explain the operation of depletion mode MOSFET. Also draw the static characteristics.	(14)

Module 2

13	a) Design a non inverting amplifier with gain 10	(10)
	b) List the applications of OP AMP	(4)
14	Explain inverting and noninverting comparator using OP AMP.	(14)

Module 3

15 List the applications of PLL. Explain frequency multiplication using PLL with neat sketches. (14)

16 a) Describe the working of 555 timer in monostable configuration. (10)

b) Compare LPF and HPF (4)

Module 4

17 a) Implement the following function with MUX (10)

$F(a,b,c)=\sum m(1,3,5,6)$

b) Compare K map and tabular methods of minimization. (4)

18 Design a 4-bit binary to gray code converter (14)

Module 5

19 Design a 3 bit ripple counter (14)

20 With neat diagrams explain the working of the following types of shift registers (14)

a) Serial-in-serial-out

b) Serial-in parallel-out

c) Parallel -in serial-out

d) Parallel-in parallel-out

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