A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 54B01

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Biomedical Engineering

15UBM401-ANALOG AND DIGITAL INTEGRATED CIRCUITS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Output impedance of an ideal op-amp is _____. CO1- R

   (a) Infinity (b) Zero (c) One (d) Undefined

2. If the feedback/input resistor ratio of a feedback amplifier is 4.6 with 1.7 V applied to the non inverting input, what is the output voltage value? CO1- R

   (a) 7.82 V (b) 8.27 V (c) 9.25 V (d)9.52

3. Op-amp used as high and low pass filter circuits employ _____ configuration. CO2- R

   (a) Non-Inverting (b) Comparator (c) Open-loop (d) Inverting

4. In successive approximation ADC technique n-bit conversion requires _____ clock period. CO2- R

   (a) n (b) n-1 (c) 2^n (d) 2^{n-1}

5. An astable multivibrator is also known as _____. CO3- R

   (a) One-Shot Multivibrator (b) Free-Running Multivibrator

   (c) Bistable Multivibrator (d) Monostable Multivibrator

6. The accurate and stable time delays are produced by_____. CO3- R

(a) Schmitt trigger (b) PLL (c) VCO (d) 555 Timer

7. The gate required to build a half adder are _____. CO4- R

(a) EX-OR gate and NOR gate (b) EX-OR gate and AND gate

(c) EX-OR gate and OR gate (d) Four NAND gates

8. Encoder is a combinational circuit that usually contains _____ CO4- R

(a) 2^n inputs and n outputs (b) n inputs and 2^n outputs

(c) 2^n inputs and 1 output (d) 1 inputs and 2^n output

9. The output Q of JK flip flop is 1. It changes to 0 when a clock pulse is applied. The input J & K are respectively. CO5- R

(a) 1 & X (b) X & 1 (c) 0 & X (d) X & 0

10. State diagram of D flip flop consists of _____ number of states. CO5- R

(a) 2 (b) 4 (c) 8 (d) 10

PART – B (5 x 2= 10 Marks)

11. Define CMRR of an op-amp. CO1 R

12. Differentiate Schmitt trigger and comparator. CO2 R

13. List the application of analog multiplier. CO3 R

14. Prove that ABC + ABC' + AB'C + A'BC = AB + AC + BC CO4 R

15. Compare volatile and non-volatile memory. CO5 R

PART – C (5 x 16= 80 Marks)

16. (a) With neat sketch explain the operation of an instrumentation amplifier. CO1- App (16)

Or

(b) (i) Elucidate in detail about the AC characteristics of op-amp. CO1- App (8)

(ii) In operational amplifier If R1 = 10KΩ and Rf = 100Ω , Vi=1V. A load of 25KΩ is connected to the output terminal. Calculate CO1- App (8)

(a) i_1 (b) V_0 (c) i_L (d) total current i_0 into the output pin.

17.	(a)	Design a second order active Low pass filter for a cutoff frequency of 5KHZ.	CO2- Ana	(16)
		Or		
	(b)	Describe in detail about the following Digital to Analog converters. (i) R-2R ladder (ii) Weighted Resistor types.	CO2- Ana	(16)
18.	(a)	Explain the block diagram of PLL and derive the expression for Lock range and capture range.	CO3- Ana	(16)
		Or		
	(b)	With a neat functional diagram, explain the operation of VCO. Also derive an expression for f_0.	CO3- Ana	(16)
19.	(a)	(i) Simplify the following function $F(A,B,C,D)=\Sigma m(0,1,2,4,6,9,12,14)$ using K-Map method and implement the minimal expression using only NAND gates.	CO4- Ana	(12)
		(ii) Design a full Subtractor using only NAND gates.	CO4- Ana	(4)
		Or		
	(b)	(i) Reduce the following equation using Quine McCluskey method. $F(A,B,C,D) = \Sigma m(0,1,3,4,5,7,10,13,14,15)$	CO4- Ana	(12)
		(ii) Convert the Boolean expressions to canonical form A'C + A'B + AB'C + BC	CO4- Ana	(4)
20.	(a)	Explain the various methods by which a shift register shifts data out of a register.	CO5- U	(16)
		Or		
	(b)	Design a 3-bit binary synchronous counter using JK Flip-flops.	CO5- U	(16)