



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN  
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]  
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

**Question Paper Code: 7020**

**B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024**

**Sixth Semester**

**Electronics and Communication Engineering**

**U19ECV18 – VLSI for Wireless Communication**

**(Regulation 2019)**

**Time: Three Hours**

**Maximum: 100 Marks**

**Answer ALL the questions**

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

**PART – A**

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What is impedance matching?	2	K1	CO1
2.	Draw the voltage divider bias based common emitter amplifier using BJT.	2	K1	CO1
3.	An audio signal $A_1 \cos(\omega_1 t)$ is passed as an input to the mixer. The mixer gets another input from the local oscillator which generates $A_2 \cos(\omega_2 t)$ . The output of the mixer is sent as the input to the low pass filter. Find the output of low pass filter.	2	K3	CO2
4.	Draw the circuit diagram of single balanced mixer.	2	K2	CO2
5.	Draw the circuit diagram of inverters based ring oscillator. Also, find the output frequency if n inverters are used and each with the critical path delay of T.	2	K2	CO3
6.	Draw the circuit diagram of D Flip-flop based frequency divider by the factor two.	2	K2	CO3
7.	Outline channel equalization using an adaptive filter.	2	K2	CO4
8.	List a few analog to digital converters.	2	K2	CO4
9.	Highlight the advantages of CDMA over FDMA and TDMA.	2	K2	CO5
10.	Let the data need to be sent by four transmitters 1, 2, 3, and 4 are a, -a, a, and a respectively. Let the orthogonal code words of these transmitters are [1,1,1,1], [1,-1,1,-1], [1,1,-1,-1], and [1,-1,-1,1] respectively. Find the compound code word sent by these transmitters over the channel using CDMA.	2	K3	CO5

PART - B

(5 x 13 = 65 Marks)

Q.No.

Questions

Marks KL CO  
8 K5 CO1

11. a) i. In a MOSFET amplifier as shown in Figure 1,  $V_{th} = 0.4V$ ,  $\beta/2 = 0.5mA/V^2$ , and the channel length modulation parameter  $\lambda = 0.02$ . Find the  $R_{in}$ , input impedance  $Z_{in}$ , output impedance  $Z_{out}$ , and voltage gain  $A_v$ .

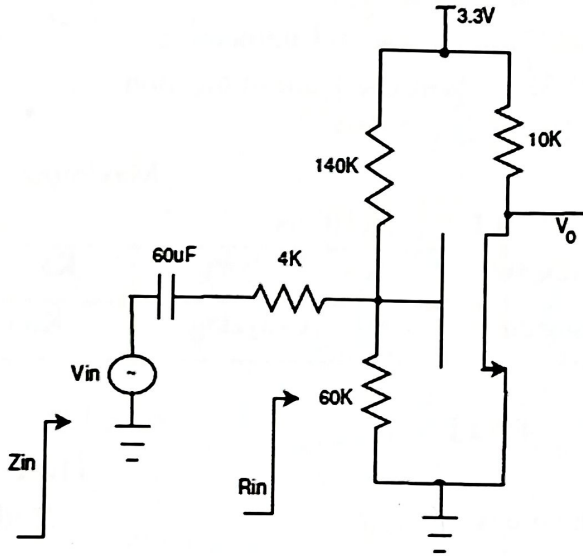


Figure 1

- a) ii. In a MOSFET circuit as shown in Figure 2,  $V_{th} = 2V$ ,  $R_D = 1K$   $\Omega$ , and  $I_D = 4mA$ . The transistor works at saturation. Find  $\beta$ .

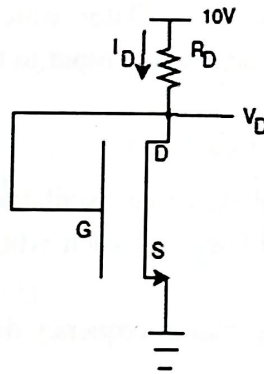


Figure 2

(OR)

- b) i. In a MOSFET circuit as shown in Figure 3,  $V_{th} = 2V$  and  $\beta/2 = 8 \times 60 \mu A/V^2$ . The transistor works at saturation. Find  $I_D$ ,  $V_{DS}$ , and  $V_{GS}$ .

K5 CO1

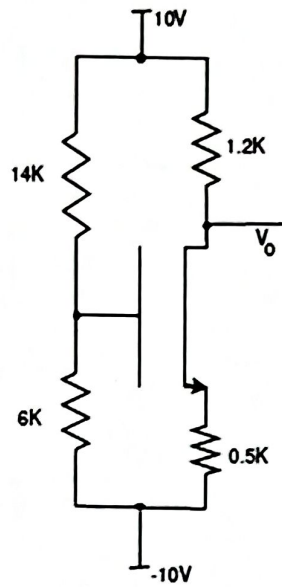


Figure 3

- ii. In a circuit as shown in Figure 4,  $I_D = 0.5mA$ ,  $V_{th} = 1V$ , and  $\beta = 5 \times 10^{-4} A/V^2$ . Find the values of  $V_{DS}$  and  $R_D$ .

K5 CO1

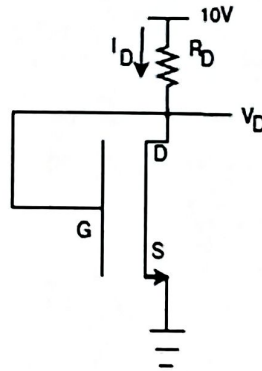


Figure 4

12. a) Draw the circuit diagram of Gilbert mixer and explain its operation? 13 K2 CO2  
(OR)  
b) Draw the circuit diagram of double balanced passive mixer and explain its operation? 13 K2 CO2
13. a) i. Draw Colpitts LC oscillator and derive the operating frequency? 8 K2 CO3  
ii. Explain the frequency synthesis using PLL with neat sketch? 5 K2 CO3  
(OR)  
b) i. Draw Hartley LC oscillator and derive the operating frequency. 8 K2 CO3  
ii. Draw voltage controlled oscillator (VCO) and explain the operation with necessary sketch. 5 K2 CO3

14. a)	Explain the heterodyne receiver along with the problem of image frequency with necessary sketch.	13	K2	CO4
(OR)				
b)	Explain the operation of Hartley image-reject receiver with necessary sketch.	13	K2	CO4
15. a)	i. Explain direct sequence CDMA with necessary sketch.	8	K2	CO5
	ii. Explain frequency hopping CDMA with necessary sketch.	5	K2	CO5
(OR)				
b)	i. Explain IS-95 CDMA with necessary sketch.	8	K2	CO5
	ii. Explain wideband CDMA with necessary sketch.	5	K2	CO5

### PART – C

(1 x 15 = 15 Marks)

Q.No.	Questions	Marks	KL	CO
16. a)	Draw the circuit diagrams of Class A, B, C, and E power amplifiers and explain their operation with necessary sketch. Also, find the efficiency of each of these power amplifiers?	15	K4	CO1
(OR)				
b)	Draw the circuit diagrams of Pulse Swallow Divider, Dual-Modulus Divider, and Miller Divider and explain their operation with necessary sketch?	15	K2	CO3