ME - VLSI

Reg.No.:								

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

Question Paper Code: 2012

M.E. / M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

VLSI DESIGN

P19MA102 - APPLIED MATHEMATICS

(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.	If the random variable X takes the values 1, 2, 3 and 4 such that 2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4) . find the probability distribution function of X.	2	K1	CO1
2.	A continuous random variable X has PDF $f(x)=\begin{cases} 2e^{-2x} & if \quad x \geq 0 \\ 0 & if \quad elsewhere \end{cases}$ Find Moment generating function of X.	2	K1	CO1
3.	Write the condition for the application of χ^2 test.	2	K1	CO2
4.	State the important properties of "t" distribution.	2	K1	CO2
5.	What is a slack Variable?	2	K2	CO3
6.	What is unbalanced transportation problem?	2	K2	CO3
7.	Write the Applications of dynamic programming.	2	K3	CO4
8.	State Bellman's Principle of optimality.	2	K3	CO4
9.	What do you understand by kendall's notation?	2	K3	CO5
10.	Define transient state and steady state.	2	K3	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i	Find the Moment Generating Function of the binomial distribution and hence find mean and variance.	8	K1	CO1
		ii	State and Prove memory less property of Exponential distribution.	8	K1	CO1
			(OR)			
	b)	i	Define Poisson Distribution. Why Poisson distribution is said to be limiting case of binomial distribution? A book of 500 pages contains 500 mistakes. Find the probability that there are at least four mistakes in a randomly selected page.	8	K1	CO1
		ii	The weekly wages of 1000 workmen are normally distributed around a mean of Rs 70 with a SD of Rs 5. Estimate the number of workers whose weekly wages will be 1) Between Rs 69 and Rs 72 2) Less than Rs 69 and	8	K1	CO1
12.	a)	i	Two independent samples of size 9 and 7 from a normal population had the following values of the variables	8	K1	CO2

Sample I	18	13	12	15	12	14	16	14	15
Sample II	16	19	13	16	18	13	15	-	-

Do the estimates of the population variance differ significantly at 5% level?

			ii	The following table gives the values of protein from kangeyam cow's milk and buffalo's milk. If these differences are significant .	8	K1	CO2

Cow's milk	1.9	1.95	2	2.02	1.85	1.8
Buffalo's milk	2.12	2	2.2	2.45	2.2	2.1

(OR)

				Test the normality of the following distribution by using Ψ^2 test of goodness of fit.	8	K1	CO2
b)	i						

x	125	135	145	155	165	175	185	195	205	Total
y	1	1	14	22	25	19	13	3	2	100

		ii	Write down the probability density of student's t-distribution .How will you get the critical value of 't' for a single –tailed test at level of significance ? A salesman is expected to effect an average sales of Rs.3500. A sample test revealed that a particular salesman had made the following sales: Rs.3700; 3400,2500,5200,3000 and 2000. Using 0.05 level of significance, conclude whether his work is below standard or not.	8	K2	CO2

13. a) Use simplex method to solve the LPP 16 K2 CO3

Maximize $Z = 20x_1 + 6x_2 + 8x_3$

Subject to

$8x_1 + 2x_2 + 3x_3 \leq 250$

$4x_1 + 3x_2 \leq 150$

$2x_1 + x_3 \leq 50$

and $x_1, x_2, x_3 \geq 0$

(OR)

b) Find the optimum solution to the following Transportation problem 16 K2 CO3

Factory	Ware house				Capacity
	D	E	F	G	
A	42	48	38	37	160
B	40	49	52	51	150
C	39	38	40	43	190
Demand	80	90	110	160	

14. a) Solve the LPP by dynamic programming problem 16 K3 CO4

$$\text{Max } Z = 3x_1 + 4x_2$$

subject to $2x_1 + 5x_2 \leq 120$

$4x_1 + 2x_2 \leq 80$

$x_1, x_2 \geq 0$.

(OR)

b) A member of a certain political party is making plans for an upcoming presidential election. He has received the services of six volunteer workers for precinct work and he wishes to assign them to three precincts in such a way as to maximize their effectiveness. He feels that it would be inefficient to assign a worker to more than one precinct, but he is willing to assign no work anyone of the precincts if they can accomplish more in other precincts. 16 K3 CO4

The following table gives the estimated increase in the plurality of the party's candidate if it were allocated various number of workers:

	Precincts		
Number of Workers	1	2	3
0	0	0	0
1	25	20	33
2	42	38	43
3	55	54	47
4	63	65	50
5	69	73	52
6	74	80	53

How many of the workers should be assigned to each of the three precincts in order to maximize total estimated increase in the plurality of the party's candidate?

15.	a)	i	A television repairman finds that the time spent on his jobs has an exponential distribution with mean of 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 10 per 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in?	8	K3	CO5
		ii	In a railway marshalling yard, goods train arrive at a rate of 30 trains per day. Assume that inter-arrival time and the service time distribution follows an exponential distribution with an average of 36 minutes. Calculate the following 1) Service Utilization 2) Expected No of units Waiting in system	8	K3	CO5
			(OR)			
	b)	i	A petrol pump station has 2 pumps. The service time follows the exponential distribution with a mean 4 minutes and car arrive for service in a Poisson process at the rate of 10 cars per hour. 1) Find the probability that a customer has to wait for service. 2) What proportion of time pumps remains idle?	8	K3	CO5
		ii	Arrivals at a telephone booth are considered to be Poisson distributed with an average time of 10 minutes between one arrival and the next. The length of phone call is assumed to be distributed exponentially, with mean 3 minutes. i. What is the average length of the queue that forms from time to time? ii. What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call?	8	K3	CO5

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Question Paper Code: 7035

M.E./ M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

VLSI Design

P19VD101 - CMOS ANALOG VLSI DESIGN

(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.	Why MOSFET is better as a switch?	2	K2	CO1
2.	Enumerate the different stages of PLL.	2	K1	CO1
3.	What is current mirror in BJT and MOSFET?	2	K2	CO2
4.	What is the concept of Wilson current mirror in CMOS?	2	K2	CO2
5.	Mention the characteristics and applications of transconductance amplifiers.	2	K1	CO3
6.	Define Distortion in amplifiers. Enumerate the types of distortion.	2	K1	CO3
7.	What is the significance of capacitor swapping in cyclic DAC?	2	K2	CO4
8.	What is the need for oversampling in a DAC?	2	K2	CO4
9.	Why do we need to properly apply a packaging technology on electronic components?	2	K3	CO5
10.	What are the unique features of photo lithography?	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Draw the small signal equivalent circuit MOSFET and explain it in detail. Analyze the parameters. Explain the significance of small signal models with examples.	13	K3	CO1
		(OR)			
	b)	i. What is the concept of switched capacitor filter? Explain with a neat diagram.	6	K2	CO1
		ii. Write a technical note on Field Programmable Analog Array	7	K2	
12.	a)	i. Why Cascode current mirrors are preferred over basic current mirrors? Explain with an example.	6	K2	CO2
		ii. How to improve the match of the current mirror differential pairs? Explain in detail with an example.	7	K2	
		(OR)			
	b)	Draw a beta multiplier reference and explain. Analyze the process and temperature performance of a CMOS Beta multiplier voltage reference.	13	K3	CO2
13.	a)	Enumerate and explain three main types of CMOS amplifier. Draw the schematic of CMOS differential amplifier and explain. Analyze its parameters.	13	K3	CO3
		(OR)			
	b)	Define noise in amplifiers. Explain and analyze different types of noise and distortion in amplifiers.	13	K2	CO3
14.	a)	Discuss in detail the basic guide lines for layout design of mixed signal PCBs, with examples.	13	K2	CO4
		(OR)			
	b)	What is the concept of High speed capacitive pipeline DACs? Enumerate and explain the steps for designing and analyzing the high speed capacitive pipeline DACs.	13	K3	CO4
15.	a)	Explain the different types of IC packages with neat diagrams. Also explain the types of IC packaging material.	13	K2	CO5
		(OR)			
	b)	Define and explain the significances of i. Oxidation ii. Ion Implantation iii. Etching iv. Metallization with examples.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Draw the schematic of Successive Approximation type ADC and explain its working in detail. What are the major elements in it? Explain in detail. Differentiate SA ADC from other commonly used ADCs.	15	K2	CO4
		(OR)			
	b)	Give an account on	15	K2	CO5
		i. Thermal and stress modeling			CO4
		ii. Charge scaling DAC			CO1
		iii. FPAA applications with examples.			

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Question Paper Code:7036

M.E./ M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

VLSI Design

P19VD102 – VLSI DIGITAL SIGNAL PROCESSING

(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)

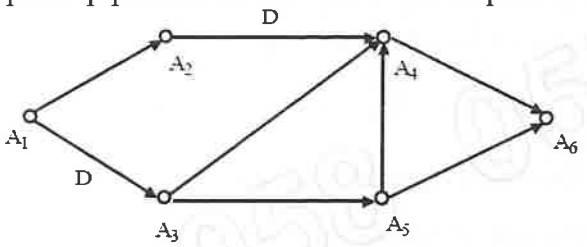
Q.No.	Questions	Marks	KL	CO
1.	Define critical path and iteration bound.	2	K1	CO1
2.	What is the difference between DFG and the dependency graph?	2	K2	CO1
3.	Draw a 2x2 odd-even merge sort architecture.	2	K1	CO2
4.	Write the rules used in the unfolding algorithm.	2	K2	CO2
5.	What is the advantage of Modified Cook-Toom's algorithm over the Cook-Toom Algorithm?	2	K1	CO3
6.	What is algorithmic strength reduction?	2	K1	CO3
7.	Define the term: Sign extension.	2	K1	CO4
8.	Mention the properties of CSD numbers.	2	K1	CO4
9.	Define clock skew.	2	K1	CO5
10.	Define the term: Numerical strength reduction.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	Derive the expression for reduced power consumption for a pipelined filter.	13	K3	CO1

(OR)

	b)	In the SFG shown, the computation time of each node is assumed to be 1 u.t. Calculate the critical path computation time. Obtain an appropriate pipelined circuit with a critical path of 2 u.t. 	13	K4	CO1
12.	a)	Obtain a 4x1 merge sort circuit using 1x1 CS units.	13	K3	CO2
		(OR)			
	b)	Unfold the equation y(n)=ay(n-5)x(n) by a factor J=2.	13	K3	CO2
13.	a)	Design a 3-level pipelined architecture for the IIR filter y(n+1)=ay(n)+u(n).	13	K3	CO3
		(OR)			
	b)	Explain register minimization using folded architectures for the following: i. Bi Quad filter. ii. IIR filters.	13	K2	CO3
14.	a)	Obtain the CSD number for the 2's complement number 0.11011101	13	K2	CO4
		(OR)			
	b)	Explain Lyon's precision multiplication.	13	K2	CO4
15.	a)	What is wave pipelining, and derive an expression for the clock period?	13	K2	CO5
		(OR)			
	b)	Explain the determination of clock period in edge-triggered systems in the presence of clock skew.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Explain pipelining and parallel processing for low power with examples.	15	K2	CO1
		(OR)			
	b)	Explain modified wino-grad algorithm with necessary steps and construct a 2*3 convolution algorithm using the modified wino-grad algorithm with m(p)=p(p-1)(p+1).	15	K3	CO5

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Question Paper Code: 7037

M.E./M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

VLSI Design

P19VD103 – EMBEDDED SYSTEM DESIGN

(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.	Differentiate microprocessor and microcontroller.	2	K2	CO1
2.	List the features of RTOS?	2	K1	CO1
3.	Draw the schematic representation of embedded design cycle.	2	K1	CO2
4.	Define co-design and co-verification.	2	K1	CO2
5.	Write down the advantages and disadvantages of debug kernel.	2	K1	CO3
6.	Draw the block diagram of ROM emulator.	2	K1	CO3
7.	What are the issues of using In Circuit Emulators in embedded system design?	2	K2	CO4
8.	Define timing constraints and physical constraints of emulators.	2	K1	CO4
9.	What is the need of testing?	2	K1	CO5
10.	Define Gray-box testing.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Explain about the details of hardware units available in embedded system.	7	K2	CO1
		ii.	Discuss about the factors to be considered for selection of processor in embedded system.	6	K2	

(OR)

	b)		Explain the role of RTOS microcontroller in embedded system design.	13	K2	CO1
12.	a)		Discuss in detail the memory organization in embedded systems.	13	K3	CO2
			(OR)			
	b)	i.	Discuss hardware and software duality with example.	5	K2	CO2
		ii.	With suitable example with c code, explain speed and code density.	8	K2	
13.	a)		List the need for watchdog timer in an embedded application. Explain how it protects the system with an example.	13	K2	CO3
			(OR)			
	b)	i.	What does it mean by cache replacement technique? Why it is needed for embedded system?	7	K2	CO3
		ii.	Tabulate the necessity of flash memory and RAM used in embedded system.	6	K2	
14.	a)	i.	Explain in detail bullet-proof run control with block diagram.	6	K2	CO4
		ii.	Discuss real time tracing and explain how to set the triggers in emulators.	7	K2	
			(OR)			
	b)		Discuss briefly on memory management of overlap memory on cache replacement techniques.	13	K2	CO4
15.	a)		Discuss when to test, how to choose the test cases in embedded system.	13	K3	CO5
			(OR)			
	b)	i.	Explain in detail the testing of embedded software.	6	K2	CO5
		ii.	Discuss performance testing with code Test performance analysis tool.	7	K2	

PART – C

(1 x 15 = 15Marks)

Q.No.			Questions	Marks	KL	CO
16.	a)	i.	Develop a chart for brief about the importance of following: Multitasking OS, IP core, System on Chip and ASSP in modern trends.	8	K2	CO5
		ii.	List out the tests of five industry-specific tests suite of EEMBC benchmark tests list.	7	K2	
			(OR)			
	b)		Where multiple interrupts are needed? How they are executed in embedded system-based applications.	15	K2	CO3

Library

ME./M.Tech/Ph.D.

Reg.No.:								

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Question Paper Code: 7038

M.E./M.Tech. DEGREE END-SEMESTER EXAMINATIONS – FEB. 2023

First Semester

VLSI Design

P19VDE13 – INTRODUCTION TO MEMS

(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.	Compare MEMS and Microsystems.	2	K2	CO1
2.	State Bulk Micromachining.	2	K1	CO1
3.	Differentiate anisotropic and isotropic etching diagrammatically.	2	K2	CO2
4.	What is a smart sensor?	2	K1	CO2
5.	What are the classes of microactuators?	2	K1	CO3
6.	What is printer head and how does it work?	2	K1	CO3
7.	Classify the types of micro motor. Draw micro rotary motor.	2	K2	CO4
8.	List any four silicon dioxide and silicon nitride properties.	2	K1	CO4
9.	Write two applications of microarrays.	2	K1	CO5
10.	What are called photonic devices? Give examples.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Explain in detail historical background and application of MEMS.	13	K2	CO1
			(OR)			
	b)	i.	Outline the concepts of silicon pressure sensor and give any five advantages and disadvantages.	7	K2	CO1
		ii.	Discuss in detail about each micromachining techniques.	6		
12.	a)	i.	Explain Thermal Sensor principles and give examples.	9	K2	CO2
		ii.	Differentiate mechanical sensors & Biosensors.	4		
			(OR)			
	b)		Elaborately discuss about chemical sensor with necessary block diagrams.	13	K2	CO2
13.	a)		Explain in detail about construction and working of micro actuators.	13	K2	CO3
			(OR)			
	b)		Explain the working of the following micro actuators.			
		i.	Micro valves	7	K2	CO3
		ii.	Micro pumps	6		
14.	a)		Explain with figures the steps in poly silicon surface machining. Discuss the various fabrication challenges associated with surface micromachining.	13	K2	CO4
			(OR)			
	b)		With necessary block diagram explain the concept of piezoelectric materials.	13	K2	CO4
15.	a)		Explain in detail about Optical MEMS.	13	K2	CO5
			(OR)			
	b)		Discuss in detail about DNA micro array and state the limitations.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Describe about integrated circuit manufacturing process with necessary diagram.	15	K2	CO1
		(OR)			
	b)	Write short note on Gene-disease association and DNA chip. Is MEMS a multidisciplinary field? Justify your view.	15	K3	CO5