ELTX

QP code - 94023

University of Mumbai
Examinations Summer 2022
Program: Electronics Engineering
Curriculum Scheme: Rev 2016
Examination: BE Semester VIII

Course Code: ELX DLO8042
Time: 2-hour 30 minutes

Course Name: MEMS Technology
Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	DMD Stands for
Option A:	Discrete Mirror Device
Option B:	Digital Mirror Device
Option C:	Digital Micromirror Device
Option D:	Discrete Micromirror Device
2.	Which of the following is not a piezo electric sensor?
Option A:	PZT
Option B:	Roscelle salt
Option C:	Quartz
Option D:	Microheater
3.	What is Piezo resistivity?
Option A:	Electrical voltage changes in response to mechanical stress
Option B:	Electrical resistance changes in response to mechanical stress
Option C:	Electrical current changes in response to mechanical stress
Option D:	Producing an electric field when subjected to an external force
4.	An Alloy that can be deformed when cold but returns to its pre-deformed shape when heated?
Option A:	Polymers
Option B:	Metal
Option C:	Shape memory alloy
Option D:	Quartz
5.	The ratio of Maximum deflection of cantilever beam to its ----------- is called stiffness of the beam.
Option A:	Load
Option B:	Span
Option C:	Slope
Option D:	reaction at the support.
6.	Lorentz forces are useful for closed-loop feedback in systems employing -------- sensing.
Option A:	Magnetic
Option B:	Electromagnetic
Option C:	Piezoresistive
Option D:	Electrostatic
7.	Product after etching of Si wafer with KoH is-------- shape.
Option A:	Square

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Option B:	Circular at the end
Option C:	Trapezoidal
Option D:	Oval
8.	To deposit polymers which deposition method is used?
Option A:	CVD
Option B:	LPCVD
Option C:	HPCVD
Option D:	PECVD
9.	What is Sputtering?
Option A:	Process of Cleaning
Option B:	Process of Deposition
Option C:	Process of Diffusion
Option D:	Process of Oxidation
10.	The principal microfabrication process used in bulk manufacturing is
Option A:	Etching
Option B:	chemical vapour deposition
Option C:	physical vapour deposition
Option D:	Diffusion

Q2 (20 Marks)	**Solve any Four out of Six** **5 marks each** (All Questions carry equal marks)
A	Discuss the role of SU8 in MEMS applications.
B	What is MEMS? What is significant difference between Microelectronics and Microsystem?
C	Explain Air-Bag deployment system in brief.
D	Differentiate between bulk and surface micro machining.
E	What are different types of pressure sensors
F	Define the term TCR. Also describe the method of characterization of TCR.

Q3 (20 Marks)	**Solve any Two Questions out of Three** **10 marks each** (All Questions carry equal marks)
A	Discuss the process flow of Photolithography. Explain the types of photoresists used.
B	What are micro-actuators pertaining to MEMS Technology? Give two examples.
C	Describe the representative process flow for fabricating the micro-heater. Also explain the operating principle of this MEMS device in detail with its analytical expression.

Q4 (20 Marks)	**Solve any Two Questions out of Three** **10 marks each** (All Questions carry equal marks)
A	What is MEMS micromachining? Explain in details fabrication process flow of LIGA. Why electroplating is necessary in LIGA process.
B	What do you mean by wafer bonding? Explain with neat diagram, different wafer bonding techniques.
C	List and explain all the types of failure mechanisms used in MEMS.

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Examinations Summer 2022

QP code- 93808

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2016

Examination: BE Semester: VIII

Course Code: ELXDLO_8044

Course Name: Digital Image Processing

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Assuming that a 10m high structure is observed from a distance of 20m. What is the size of retinal image? Assume that the distance between the lens and retina is 17mm.
Option A:	8.5 mm
Option B:	34mm
Option C:	0.118mm
Option D:	34cm
2.	Which of the following is not a point processing operation?
Option A:	Histogram Processing
Option B:	Digital Negative
Option C:	Contrast Stretching
Option D:	Thresholding
3.	If the original image is rotated by 45° in spatial domain the spectrum gets rotated by
Option A:	45°
Option B:	65°
Option C:	0°
Option D:	180°
4.	Thinning operation is used to remove the ________ pixels
Option A:	image
Option B:	foreground
Option C:	object
Option D:	back ground
5.	Identify the operator X, Where X=[0 -1 0; -1 4 -1; 0 -1 0]
Option A:	Sobel edge operator
Option B:	Prewitt edge operator
Option C:	Gradient operator
Option D:	Laplacian operator
6.	Mask used for line detection is ______
Option A:	Gaussian
Option B:	Laplacian
Option C:	Ideal
Option D:	Butterworth
7.	Basis images can be generated by ______
Option A:	Symmetric matrices
Option B:	Unitary matrices
Option C:	Non symmetric matrices

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Option D:	Circulant matrices
8.	Which of the following transform give multiresolutional analysis?
Option A:	Discrete Fourier Transform
Option B:	Discrete Cosine Transform
Option C:	Fast Fourier Transform
Option D:	Discrete Wavelet Transform
9.	Which block in image processing system introduces lossy compression?
Option A:	Mapper
Option B:	Quantizer
Option C:	Variable length coding
Option D:	negative
10.	IGS code for 100, 110 are
Option A:	1000, 0110
Option B:	0110, 0111
Option C:	0110, 1000
Option D:	0110 , 0111

Q2.	
A	**Solve any Two** **5 marks each**
i.	Explain digital image sampling and quantization.
ii.	Explain Hough transform for edge linking.
iii.	Give Laplacian operator and explain how it is used to detect edges.
B	**Solve any One** **10 marks each**
i.	Apply the following image enhancement techniques for the given 3 bits per pixel image segment. (i) Digital Negative (ii) Thresholding (T = 5) (iii) Intensity level slicing with and without background with r_1=2 and r_2=4.

4	6	0	3	7
2	1	5	0	3
4	2	7	0	7
1	5	4	6	0
4	7	5	4	1

ii.	The grey level distribution of an image is shown in table below. Perform Histogram equalization and plot histograms of original and equalized images. Explain need of histogram equalization.

Gray Level	0	1	2	3	4	5	6	7
Frequency of Occurrence	100	250	100	300	150	0	0	0

Q3.	
A	**Solve any Two** **5 marks each**
i.	Explain Hit - and - Miss Transform.
ii.	Write short note on Homomorphic filtering.
iii.	Explain the following morphological operations:- i. Opening ii. Closing
B	**Solve any One** **10 marks each**
i.	What is image segmentation? Explain with example segmentation based on similarities.
ii.	Name and explain different types of data redundancies in digital image. Classify the following compression techniques in to lossy and loss less:- (i) IGS coding (ii) Run length coding (iii) Transform coding (iv) DPCM coding

Q4.	
A	**Solve any Two** **5 marks each**
i.	Explain the procedure of Huffman coding.
ii.	State the expression for one dimensional Discrete Cosine Transform. Give the importance of DCT in image compression.
iii.	Explain Discrete Wavelet Transform.
B	**Solve any One** **10 marks each**
i.	What is Hadamard Transform? State its properties. Calculate the Hadamard Transform of following image. 2 1 2 1 1 2 3 2 2 3 4 3 1 2 3 2
ii.	Explain with block diagram JPEG encoder and decoder.

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University of Mumbai

Summer Examination 2022

Program: BE Electronics Engineering

Curriculum Scheme: Rev2016

Examination: BE Semester VIII

Course Code: ELX 801 and Course Name: Internet of Things

Time: 2-hour 30 mins — Max. Marks:80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Communication Environments in case of data routing over the Web for connected devices are Classified into which of the following options:
Option A:	CoRE Environment and Unconstrained Environment
Option B:	CoRE Environment and Constrained Environment
Option C:	Casual Environment and Bock Environment
Option D:	Free Space Environment and Atmospheric Environment
2.	SOAP is a protocol for:
Option A:	exchange of objects between applications using XML
Option B:	exchange of objects between applications using text
Option C:	exchange of control information between the sender and receiver
Option D:	exchange of KEYS between the sender and receiver
3.	CoAP-MQ broker :
Option A:	Acts as a firewall
Option B:	senses data from various sensors
Option C:	store only control messages intended to other nodes.
Option D:	enables web client publishing of updates to the endpoints
4.	DHCP facilitates:
Option A:	Static IP Addressing in any networks
Option B:	Dynamic IP Addressing in any network
Option C:	MAC ID allotment to all devices connected in the network
Option D:	The generation of IO port numbers
5.	AMQP is designed for:
Option A:	Control data transfer
Option B:	LANs and WANs
Option C:	Business Messaging
Option D:	Spatial co-ordinate node selection in WSN
6.	UDP protocol is used for:
Option A:	acknowledged data flow
Option B:	unacknowledged data flow
Option C:	Reliable communication
Option D:	full duplex secured communication
7.	Observer nodes can:
Option A:	Process information and use it for various applications but they do not perform any control functions.
Option B:	Process information and performs control Actions.

Option C:	Perform only control Actions whenever required.
Option D:	Cannot perform processing operation but acts as a repeater node.
8.	A Home Automation System Application will have following set of services:
Option A:	Controller service, Mode Service ,State Service
Option B:	Controller Service only
Option C:	Mode Service and State Service only
Option D:	Controller service and State Service only
9.	Which sensors will not be used for weather monitoring system
Option A:	Temperature sensor
Option B:	Pressure sensor
Option C:	Acceleration sensor
Option D:	Relative Humidity Sensor
10.	Online Transaction Processing (OLTP) is used in:
Option A:	Internet of automatic chocolate vending machines
Option B:	Internet of ATMs
Option C:	Internet of RFIDs
Option D:	Internet of streetlights

Q2. (20 Marks)	
A	**Solve any Two** **5 marks each**
i	Draw and explain IoT Level 1, IoT Level 5 and IoT Level 6.
ii	List the various REST Architectural constraints and explain any two in detail
iii	List the features in Xively cloud platform.
B	**Solve any One** **10 marks each**
i	Explain the various design methodology steps in sequence.
ii	Write a short note on i)LPWAN ii) NBIoT

Q3. (20 Marks)	
A	**Solve any Two** **5 marks each**
i	Explain the various Data Categorizations for storage in IoT Systems.
ii	List the semantics followed by NOSQL instead of ACID rules that are followed in normal databases.
iii	Compare the various types of OLTP available.
B	**Solve any one** **10 marks each**
i	Explain the CoAP and AMQP Protocol.
ii	Draw and detail the deployment design of any weather monitoring IoT System.

Q4. (20 Marks)	
A	**Solve any Two** **5 marks each**
i	Explain how the following electrical parameters are used as a part of sensing Technology: a) Capacitance and b) reverse saturation current of PN Junction
ii	What are the Characteristics of IoT?
iii	What are the advantages and Concerns of Cloud Computing?
B	**Solve any One** **10 marks each**
i	Write a short note on i)Server Management ii)Spatial Storage
ii	Explain the MQTT protocol with respect to any one IoT application.

ETRX

QP code - 93299

University of Mumbai

Examination May-June 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VIII

Course Code: ELX802 and Course Name: AnalogandMixedVLSIDesign

Time: 2 hours 30Minutes Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks 20 Marks**
1.	In current mirror circuit, the first MOSFET (which copy current from reference) is operating in which region?
Option A:	Linear
Option B:	Saturation
Option C:	Cut-off
Option D:	deep triode region
2.	Which of the following statement is true in case of Base to Emitter voltage (V_{BE}) of BJT?
Option A:	It has negative temperature coefficient
Option B:	It has positive temperature coefficient
Option C:	It has both temperature coefficient
Option D:	It is equal to $(I_B)^2$
3.	The condition for MOSFET to be in deep triode region is------------.
Option A:	$V_{DS} << 2(V_{GS}-V_{TH})$
Option B:	$V_{DS} >> 2(V_{GS}-V_{TH})$
Option C:	$V_{DS} << (V_{GS}-V_{TH})$
Option D:	$V_{DS} >> (V_{GS}-V_{TH})$
4.	Thermal noise is generated from MOSFET by -----------
Option A:	Conduction of charge carriers in the channel
Option B:	Electric field across the gate and channel
Option C:	Capacitance of the gate oxide
Option D:	Substrate bias effect
5.	CS amplifier with Source degeneration voltage gain
Option A:	increases
Option B:	decreases
Option C:	moderate
Option D:	zero

6.	ro is the internal resistance of a MOSFET is equal to
Option A:	$1/\lambda I_D$
Option B:	λ/I_D
Option C:	I_D/λ
Option D:	λI_D
7.	In Switched Capacitor circuits, to achieve a higher sampling speed, ________ & ________ must be used.
Option A:	A small aspect ratio, a small capacitor
Option B:	A Large aspect ratio, a large capacitor
Option C:	A small aspect ratio, a large capacitor
Option D:	A Large aspect ratio, a small capacitor
8.	Which of the following is the main advantage of semicustom design approach over full custom design?
Option A:	Use of standard cells to reduce design time and complexity
Option B:	High performance
Option C:	More complexity
Option D:	High Speed
9.	What is the function of low pass filter in phase-locked loop (PLL) circuit?
Option A:	Improves low frequency noise
Option B:	Removes high frequency noise
Option C:	Tracks the voltage changes
Option D:	Changes the input frequency
10.	The resolution of 8-bit DAC/ADC is ______
Option A:	562
Option B:	256
Option C:	625
Option D:	128

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain trade-offs in analog design with the help of analog design octagon.
B	What are the disadvantages of basic current mirror circuit and how it is overcome in cascode current mirror?
C	Explain the concept of switched capacitor circuit.
D	Which errors are contributed by charge injection mechanism in MOS sampling circuits?
E	Compare performance parameters of various op-amp topologies.
F	Explain behaviour of g_m as function of below parameters 1. Overdrive voltage with W/L constant. 2. Overdrive voltage with I_D constant

Q3	**Solve any two out of three** **10 marks each**
A	Derive the expression of voltage gain and output resistance of the source follower circuit.
B	What is a bandgap reference? Describe methods of implementation of band gap references.
C	Explain AMS design flow in VLSI circuit. Compare full custom and semi-custom design.

Q4	**Solve any two out of three** **10 marks each**
A	Draw and explain charge pump PLL circuit
B	What are the various types of ADC architectures? Explain any two architectures in detail.
C	Derive the equation of Differential gain and Common mode gain of differential amplifier.