Q=QUE!	question_description	question_explanat	question	question_difficulty
A=ANS\	answer_description	answer_explanatic	answer_	answer_position
Q	Type of silicon wafers are		M	1
A	n-type, p-type		1	1
A	S-type, n-type		0	2
A	a-type, b-type		0	3
A	c-type, z-type		0	4
Q	Silicon Wafers are of the shape		M	1
A	Hexagonal		0	1
A	Rectangle		0	2
A	Circle		1	3
A	Square		0	4
Q	A change in electrical resistance of solids when subjected to stress is known as		M	1
A	piezoelectricity		0	1
A	piezocrystal		0	2
A	piezocapacitance		0	3
A	piezoresistance		1	4
Q	Silicon wafer is made up of		M	1
A	silicon nitride		0	1
A	silicon dioxide		0	2
A	pure silicon		1	3
A	silicon monoxide		0	4
Q	Dopant used for polyphenylene sulfide is		M	1
A	HCl		0	1
A	NaCl		0	2
A	AsF5		1	3
A	H2O		0	4
Q	ULPA filter is		M	1
A	Ultra Light Particulate Air		0	1
A	Ultra Light Particle Air		0	2
A	Ultra Low Particulate Air		1	3
A	Ultra Low Pressure Air		0	4
Q	Which of the following is a MEMs device or component?		M	1
A	Micro gear		1	1
A	inductor		0	2

A	microscope			0	3
A	transformer			0	4
Q	Common p-type dopant for silicon is		M		1
A	boron			1	1
A	phosphorus			0	2
A	arsenic			0	3
A	antimony			0	4
Q	Micromotors are most commonly produced by		M		1
A	etching			0	1
A	AFM			0	2
A	LIGA process			1	3
A	CVD			0	4
Q	Toxic gases such as CO, CO2, NO, O3 can be detected using		M		1
A	Pressure sensor			0	1
A	Thermal sensor			0	2
A	Chemical sensor			1	3
A	Optical sensor			0	4
Q	Smaller systems tend to move more quickly than larger systems because of		M		1
A	smaller displacement			0	1
A	lower inertia of mass			1	2
A	less workdone			0	3
A	higher frequencies associated			0	4
Q	In MEMs Silicon nitride is used as		M		1
A	lens			0	1
A	actuator			0	2
A	Insulator			1	3
A	sensor			0	4
Q	Select the appropriate material for wafer		M		1
A	Silicon			1	1
A	Pure gold			0	2
A	Platinum			0	3
A	Aluminium			0	4
Q	Silicon wafer orientation is defined by the		M		1
A	quality			0	1
A	Miller index			1	2
A	packing material			0	3

A	type of silicon used			0	4
Q	Equal amount of gallium and arsenic atoms ____		M		1
A	makes a metal			0	1
A	makes a liquid			0	2
A	makes gallium arsenide			1	3
A	is not a good substrate			0	4
Q	Which of the following material is used in MEMs for its optical property		M		1
A	silicon			0	1
A	argon			0	2
A	PDMS			1	3
A	helium			0	4
Q	HEPA filters are used in		M		1
A	clean room			1	1
A	air dryer			0	2
A	water purifier			0	3
A	HCl filtering			0	4
Q	Wafers are produced by slicing		M		1
A	condiments			0	1
A	glass			0	2
A	Silicon cylindrical ingots			1	3
A	Sand			0	4
Q	Silicon is as light as		M		1
A	Aluminium			1	1
A	gold			0	2
A	iron			0	3
A	steel			0	4
Q	Silicon has same Young's modulus as		M		1
A	Aluminium			0	1
A	gold			0	2
A	iron			0	3
A	steel			1	4
Q	Silicon wafer orientation is defined by the		M		1
A	quality			0	1
A	Miller index			1	2
A	packing material			0	3
A	type of silicon used			0	4

Q	As per scaling law in electricity current and length possesses following relation		M		1
A	inverse			0	1
A	cube			0	2
A	square			1	3
A	square root			0	4
Q	____ is an optical technique used for determination of the dielectric properties of thin films		M		1
A	AFM			0	1
A	TEM			0	2
A	SEM			0	3
A	Ellipsometer			1	4
Q	In ____, transmitted electrons are involved to view thin specimens		M		1
A	TEM			1	1
A	Profilometer			0	2
A	Ellipsometer			0	3
A	AFM			0	4
Q	_____ is a resist used in electron beam lithography		M		1
A	PDMS			0	1
A	conducting polymer			0	2
A	polyaniline			0	3
A	PMMA			1	4
Q	Typical spin speed of photoresists depends on		M		1
A	velocity			0	1
A	viscosity			1	2
A	intensity			0	3
A	pressure			0	4
Q	dry etching involves the creation of		M		1
A	plasma			1	1
A	SiO2			0	2
A	photoresist			0	3
A	metal			0	4
Q	RIE stands for		M		1
A	Resonative ion etching			0	1
A	Reactive ion etching			1	2
A	Reaction ion etching			0	3
A	Reflective ion etching			0	4
Q	Role of photosensitive film is to produce _____ on substrate		M		1

A	coating			0	1
A	pattern			1	2
A	defects			0	3
A	etching			0	4
Q	The most popular light source for photolithography		M		1
A	mercury vapour lamp			1	1
A	LCD			0	2
A	incandescent lamp			0	3
A	LED			0	4
Q	The wet etching technique		M		1
A	removes unmasked area			1	1
A	removes masked area			0	2
A	add material on masked area			0	3
A	add material on unmasked area			0	4
Q	____ technique is based on the emission of secondary electrons from the surface of a specimen		M		1
A	AFM			0	1
A	SEM			1	2
A	Profilometer			0	3
A	Ellipsometer			0	4
Q	DRIE stands for		M		1
A	deep reactive ion etching			0	1
A	diode reactive ion etching			0	2
A	deep regenerative ion etching			0	3
A	deep reflective ion etching			1	4
Q	Common light sources used in photolithography have wavelength in ____ range		M		1
A	100 - 250 nm			0	1
A	300 - 500 nm			1	2
A	500 - 700 nm			0	3
A	850 - 1000 nm			0	4
Q	Ion implantation is implanting foreign substances by		M		1
A	slow diffusion			0	1
A	melting			0	2
A	insertion by force			1	3
A	diffusion			0	4
Q	RCA is used for the cleaning substrate		M		1
A	Glass			0	1

A	PMMA		0	2
A	Silicon		1	3
A	PDMS		0	4
Q	Following deposition methods used for Silicon dioxide	M		1
A	Spinning		0	1
A	Spray		0	2
A	Wet Oxidation		1	3
A	Electroplating		0	4
Q	Thermal Deposition is popular for the following material	M		1
A	Polymers		0	1
A	Dielectrics		0	2
A	Semi-conductors		0	3
A	Metals		1	4
Q	Select the appropriate technique for coating of polymers	M		1
A	Spin coating		1	1
A	Chemical Vapour Depositing		0	2
A	Physical Vapour Depositing		0	3
A	Electroplating		0	4
Q	Following is a type of chemical vapour deposition	M		1
A	Electroplating		0	1
A	Evaporation		0	2
A	LPCVD		1	3
A	PVD		0	4
Q	What is the evaporation temperature of copper in degree Celsius?	M		1
A	200		0	1
A	1516		1	2
A	0		0	3
A	25		0	4
Q	Following doping can be carried out at lower temperature	M		1
A	spraying		0	1
A	oxidation		0	2
A	ion implantation		1	3
A	diffusion		0	4
Q	In MEMs fabrication, following type of water is used	M		1
A	tap water		0	1
A	filtered water		0	2

A	salted water			0	3
A	DI water			1	4
Q	In MEMs fabrication, following is a critical environmental parameter for patterning submicron devices		M		1
A	size of the dust particle			1	1
A	size of silicon wafer			0	2
A	type of silicon wafer			0	3
A	size of the room			0	4
Q	In photolithography, sensitivity of resist depends on		M		1
A	shape of substrate			0	1
A	size of substrate			0	2
A	type of substrate			0	3
A	wavelength of light			1	4
Q	In which technique of deposition step coverage is poor		M		1
A	Evaporation			1	1
A	DC sputter			0	2
A	RF sputter			0	3
A	PECVD			0	4
Q	Which of the following deposition technique grain size is minimum		M		1
A	Thermal Evaporation			0	1
A	Sputtering			1	2
A	electron beam evaporation			0	3
A	Electroplating			0	4
Q	Which of the following deposition technique uses electrochemical reaction		M		1
A	evaporation			0	1
A	electroplating			1	2
A	PECVD			0	3
A	Sputtering			0	4
Q	Followings is a dielectric layer deposition techniques		M		1
A	Spin coating			0	1
A	Electrolessplating			0	2
A	Chemical Vapour Deposition			1	3
A	Electroplating			0	4
Q	One of the major problems of surface micromachining is		M		1
A	Absorption			0	1
A	Adhesion of layers			1	2
A	Epitaxy			0	3

A	Evaporation			0	4
Q	Sacrificial layer is an essential component in ________		M		1
A	Bulk micromachining			0	1
A	LIGA			0	2
A	Surface micromachining			1	3
A	wet etching			0	4
Q	_____ lithography technique can pattern nonplanar substrate, unusual materials and large areas		M		1
A	X- ray			0	1
A	Photo			0	2
A	soft			1	3
A	electron beam			0	4
Q	____ is a common metal used in the process steps of LIGA.		M		1
A	Nickel			1	1
A	Aluminium			0	2
A	Steel			0	3
A	Cobalt			0	4
Q	Micro-contact Printing is a technique related to _______		M		1
A	photolithography			0	1
A	electron beam lithography			0	2
A	X- ray lithography			0	3
A	soft lithography			1	4
Q	Stamp, mold, or mask having relief structures on its surface is the key element of _____		M		1
A	X- ray lithography			0	1
A	soft lithography			1	2
A	photolithography			0	3
A	electron beam lithography			0	4
Q	Lithography, Electroforming, molding are essential steps of _________		M		1
A	Bulk micromachining			0	1
A	LIGA			1	2
A	Surface micromachining			0	3
A	Evaporation			0	4
Q	Select appropriate material for substrate in LIGA		M		1
A	Glass with thin metal layer			1	1
A	Glass			0	2
A	Dielectric			0	3
A	polymer			0	4

Q	Replica molding can be used in _________	M		1
A	photolithography		0	1
A	electron beam lithography		0	2
A	X- ray lithography		0	3
A	soft lithography		1	4
Q	µTAS systems comprised of	M		1
A	only result analysis		0	1
A	a sampling unit, a microfluidic unit, a detector system and an electronic controller		1	2
A	only separation and detection of samples		0	3
A	only sample analysis		0	4
Q	In µTAS, separation methods used	M		1
A	Titration		0	1
A	Capillary electrophoresis		1	2
A	Sedimentation		0	3
A	Centrifugation		0	4
Q	Detection technique used in µTAS is	M		1
A	Fluorescence		0	1
A	Dielectrophoresis		0	2
A	Electrophoresis		1	3
A	Chromatography		0	4
Q	What is the full form of µTAS?	M		1
A	Mini Thermal Analytical System		0	1
A	Micro Total Analysis System		0	2
A	Micro Transfer Analytical System		1	3
A	Micro Total Analytics Signal		0	4
Q	In thermal microactuator, change in length depends on	M		1
A	temperature		1	1
A	flow		0	2
A	width of channel		0	3
A	size of channel		0	4
Q	In electroosmotic flow, direction of flow depends on	M		1
A	concentration of ion		0	1
A	DC supply polarity		1	2
A	particle size		0	3
A	frequency of supply		0	4
Q	In µTAS, following technique does not require charged particle	M		1

A	Electro osmosis		0	1
A	electrophoresis		0	2
A	Dielectrophoresis		1	3
A	capillary		0	4
Q	In microsyringe pump, dispense capacity depends on	M		1
A	displacement of stem		1	1
A	material of stem		0	2
A	diameter of stem		0	3
A	shape of stem		0	4
Q	In µTAS, micro channels is made up of	M		1
A	silver		0	1
A	gold		0	2
A	PDMS		1	3
A	fluoride		0	4
Q	The sampling subsystem should contain a micro filter consists of	M		1
A	filter paper		0	1
A	conventional polymer membrane		1	2
A	metal filter		0	3
A	muslin cloth		0	4
Q	The immobilization of bioreceptor is achieved by	M		1
A	Assimilation		0	1
A	Adsorption		1	2
A	Adhesion		0	3
A	cohesion		0	4
Q	Which of the following is present in glucose biosensors	M		1
A	amino acids		0	1
A	glucose oxidase		1	2
A	nucleic acid		0	3
A	galactose		0	4
Q	In case of Biosensors, ____ can be a biorecognition element	M		1
A	Oxide		0	1
A	Enzyme		1	2
A	metals		0	3
A	ceramics		0	4
Q	Which of these biosensors use the principle of heat released or absorbed by a reaction	M		1
A	Potentiometric biosensor		0	1

A	Optical biosensors			0	2
A	Piezo-electric biosensors			0	3
A	Calorimetric biosensors			1	4
Q	In glucose biosensor, a measure of change in __________ is a measure of the glucose value.		M		1
A	carbons dioxide			0	1
A	oxygen			1	2
A	nitrogen			0	3
A	ammonia			0	4
Q	Following acts as detector in Optical sensor		M		1
A	Light emitting diode			0	1
A	Transistor			0	2
A	light pipe			0	3
A	Photo diode			1	4
Q	For microencapsulation of bioreceptor _____ can be utilized		M		1
A	liposomes			1	1
A	glucose			0	2
A	Urea			0	3
A	Urease			0	4
Q	Nanoparticles that are used as drug delivery systems are called as ________		M		1
A	nanocarriers			1	1
A	nanotubes			0	2
A	nanosensors			0	3
A	nanoarray			0	4
Q	A characteristic of DNA biosensors is ______		M		1
A	formation of DNA recognition layer			1	1
A	detection of the change in light absorption			0	2
A	detection of the photon out for luminescent			0	3
A	detection of the angle at which electrons are emitted			0	4
Q	Coat and poke drug delivery approach is followed in _______		M		1
A	Drug-coated microneedle			1	1
A	Solid microneedle			0	2
A	Dissolving microneedle			0	3
A	Hollow microneedle			0	4
Q	In case of Biosensors, _____ is the most important component.		M		1
A	display			0	1
A	metals			0	2

A	ceramics			0	3
A	biorecognition element			1	4
Q	In biosensor, ____ is the physico-chemical component		M		1
A	Enzymes			0	1
A	Anti-bodies			0	2
A	Transducer			1	3
A	Cells or tissues			0	4
Q	What is an Analyte?		M		1
A	Any molecule may be protein, toxin, antigen, etc.			1	1
A	The concentration of the molecule			0	2
A	The component which should not be detected			0	3
A	The component which gives background noise			0	4
Q	Polymer membrane permeation is a type of ____		M		1
A	intravenous drug delivery			0	1
A	oral drug delivery			0	2
A	injection			0	3
A	Transdermal drug delivery system			1	4
Q	Which of the following is a painful way of drug delivery?		M		1
A	Topical cream			0	1
A	Transdermal patch			0	2
A	Hypodermic needle			1	3
A	Microneedle			0	4
Q	The simplest amperometric biosensors for glucose detection involve _____		M		1
A	pH electrode			0	1
A	Clark oxygen electrode			1	2
A	Carbon dioxide electrode			0	3
A	copper electrode			0	4
Q	Magnetic bio sensor is widely used for ____________		M		1
A	Blood detection			0	1
A	DNA detection			1	2
A	particle detection			0	3
A	photo detection			0	4
Q	The generation of ions by various chemical events that change the electrical properties of the analyte	solution is detectec	M		1
A	Ion Sensitive Biosensors			0	1
A	Colorimetric biosensors			0	2

A	Magnetic Biosensors			0	3
A	Electrochemical Biosensors			1	4
Q	Self assembled closed colloidal structures composed of lipid bilayers are called as _____.		M		1
A	dendrimers			0	1
A	liposomes			1	2
A	polymers			0	3
A	GNP			0	4
Q	Poke and patch drug delivery approach is seen in ______		M		1
A	Drug-coated microneedle			0	1
A	Solid microneedle			1	2
A	Dissolving microneedle			0	3
A	Hollow microneedle			0	4
Q	Transdermal devices deliver the drug through the___		M		1
A	Eye			0	1
A	nose			0	2
A	mouth			0	3
A	Skin			1	4
Q	____ is Level 3 of microsystems packaging		M		1
A	Die			0	1
A	Device			0	2
A	System			1	3
A	Card			0	4
Q	____ levels of packaging are there in microsystems packaging		M		1
A	Three			1	1
A	Two			0	2
A	One			0	3
A	Four			0	4
Q	____ level is Level 2 of microsystems packaging		M		1
A	Die			0	1
A	Device			1	2
A	System			0	3
A	Card			0	4
Q	____ levels of packaging are there in electronic systems packaging		M		1
A	Three			0	1
A	Two			0	2
A	One			0	3

A	Four		1	4
Q	Sawing the wafer is related to ____	M		1
A	surface bonding		0	1
A	Wire bonding		0	2
A	sealing		0	3
A	die preparation		1	4
Q	____ of microsystem component is challenging in microsystems packaging compared to microelectronics packaging	M		1
A	bonding		1	1
A	cutting		0	2
A	sawing		0	3
A	dicing		0	4
Q	____ level is Level 1 of microsystems packaging	M		1
A	Die		1	1
A	Device		0	2
A	System		0	3
A	Card		0	4
Q	Wafer dicing means	M		1
A	sawing the wafer		1	1
A	printing the wafer		0	2
A	implanting the wafer		0	3
A	surface bonding		0	4
Q	In die bonding, ___ are used for better die isolation	M		1
A	solder alloys		0	1
A	epoxy resin		0	2
A	silicon carbide		0	3
A	silicon rubber		1	4
Q	Self assembled closed colloidal structures composed of lipid bilayers are called as _____.	M		1
A	dendrimers		0	1
A	liposomes		1	2
A	polymers		0	3
A	GNP		0	4
Q	The packaging of MEMS or microsystems together with signal processing is known as ___	M		1
A	lab on a chip		1	1
A	lab on a computer		0	2
A	lab on a silicon		0	3
A	lab in a chip		0	4