1. Change in output of sensor with change in input is \_\_\_\_\_\_\_\_\_\_\_\_  
   Threashold  
   Slew rate  
   **Sensitivity**  
   Cut off value
2. Which of the following can be cause for non-zero output when zero input?  
   Bias  
   Slew  
   Offset  
   **Offset or bias**
3. Which of the following error is caused by a reversal of measured property?  
   **a) Hysterisis**  
   b) Noise  
   c) Digitization error  
   d) Quantization error
4. Smallest change which a sensor can detect is \_\_\_\_\_\_\_\_\_\_\_\_  
   **Resolution**  
   Accuracy  
   Precision  
   Scale
5. Sensitivity of a sensor can be depicted by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   a) Niquist plot  
   b) Pole- zero plot  
   c) **Bode plot**  
   d) Einstein plot
6. Thermocouple generate output voltage according to \_\_\_\_\_\_\_\_\_\_\_\_  
   a) Circuit parameters  
   b) Humidity  
   c) **Temperature**  
   d) Voltage
7. Sensor is a type of transducer.  
   **True**  
   False

Can’t say either true or false

Depend on the analyte

1. Error of a system is \_\_\_\_\_\_\_\_\_\_\_ of the measured value.

Independent

Dependent

Partially dependent

Fully dependent

1. The smallest change which a sensor can detect is termed:

Accuracy

Precision

**Resolution**

Scale

1. Sound to electrical energy transducer:

**Microphone**

AFR

Tactile sensor

Pellistor

1. Which type of sensor is used to measure the distance between the vehicle and other objects in its environment:

Tactile sensor

Motion sensor

**Ultrasonic sensor**

Pressure sensor

1. Digital sensors provide information on all possible values \_\_\_\_\_\_\_\_

without specified limit

**within specified limit**

outside of the specified limit

in boundary less

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ handle mathematical operations necessary to deliver the output signal.  
   Small sensors  
   Mat sensors  
   **Soft sensors**Super sensors
2. \_\_\_\_\_\_ needed in the smart sensor.

A/D conversion is

**A/D conversion is not**

Analyte conversions

Analyte filtrations

1. Input signal to smart sensor is fed from \_\_\_\_\_\_\_\_\_\_\_\_\_  
   Power supply  
   **Transducer**Volt meter  
   Power bank
2. Signal conditioning is carried out in \_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   **Transducer housing**  
   Processor  
   Network interface  
   Mother board
3. Output of smart sensors will of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
   Analog  
   **Digital**  
   Analog and digital

Binary

1. Which of the following defines smartness of sensor?  
   **Quality of data**Circuit size  
   Circuit components  
   Circuit integrity
2. Which of the following represents network bus?  
   Instrumentation contact  
   Field instrumentation bus  
   Data bus  
   Bit line contact
3. \_\_\_\_\_\_\_\_reacts with the target analyte or responds to the changing physical or chemical parameters

**Receptor**

Transducer

Signal Processing system

Controller

1. \_\_\_\_\_\_does not need any additional energy source and directly generates an electric signal in response to an external stimulus

**Passive sensor**

Direct sensor

Active sensor

Indirect sensor

1. \_\_\_\_\_\_require external power for their operation, which is called an excitation signal

Passive sensor

Direct sensor

**Active sensor**

Indirect sensor

1. \_\_\_\_\_\_\_ detects a stimulus in reference to an absolute physical scale that is independent on the measurement conditions

Passive sensor

Direct sensor

Relative sensor

**Absolute sensor**

1. \_\_\_\_produces a signal that relates to some special cases dependent on the measurement conditions

Passive sensor

Direct sensor

**Relative sensor**

Absolute sensor

1. \_\_\_\_\_\_\_\_\_\_\_changes the signal of the receptor to a measurable signal preferably electrical signal

Receptor

**Transducer**

Signal Processing system

Controller

1. \_\_\_\_\_\_\_\_\_\_\_measures and shows the signal in a sensing process

Central processing unit

Transducer

**Signal processing system**

Controller

1. \_\_\_\_\_\_\_\_\_has a strong dipole moment

CO2 gas

**Water**

Ethanol

Ethers

1. The generation of electric charge by a crystalline material upon subjecting it to stress is

**Piezoelectric Effect**

Secondary pyroelectric effect

Magnetic force

Capacitance

1. A development of strain in the material due to thermal expansion is

Piezoelectric Effect

**Secondary pyroelectric effect**

Magnetic force

Capacitance

1. The transverse voltage (Hall effect) measured in a Hall probe has its origin in the \_\_\_\_\_\_on a moving charge carrier.

Piezoelectric Effect

Secondary piezoelectric effect

**Magnetic force**

Capacitance

1. \_\_\_\_\_\_\_\_\_are devices which are activated by an external magnetic field.

**Hall Effect Sensor**

Piezoelectric Effect

Pyroelectric Effect

Magnetron

1. \_\_\_\_\_\_is a phenomenon in which a temperature difference between two dissimilar semiconductors produces a voltage difference between those two substances.

**Seebeck Effect**

Piezoelectric Effect

Pyroelectric Effect

Magnetron

1. Which of the following is correct for tactile sensors?

**Touch sensitive**

Pressure sensitive

Input voltage sensitive

Humidity sensitive

1. Touch screen of mobile phone uses:

AFR Sensor

Pellistor

Viscometer

**Tactile sensors**

1. Velocity of the sound in a fluid can be identified from

**Sqrt(Bulk modulus/Density)**

Sqrt(Density/Bulk Modulus)

Sqrt(Youngs modulus/Density)

Sqrt(Density/Youngs modulus)

1. Velocity of the sound in a solid can be identified from

Sqrt(Bulk modulus/Density)

Sqrt(Density/Bulk Modulus)

**Sqrt(Youngs modulus/Density)**

Sqrt(Density/Youngs modulus)

1. The common piezoelectric material works in high frequency limit is

Polyethylene

**polyvinylidene fluoride (PVDF),**

Polyethylene terephthalate

Nylon

1. \_\_\_\_\_\_\_\_\_\_\_\_are a class of microelectromechanical systems

Capacitance sensors

**Surface acoustic wave sensors**

Photodiodes

Inductance sensors

1. \_\_\_\_\_\_\_\_\_\_ sensors are utilised to measure variables such as point, velocity, acceleration, force, press, levels and flow.  
   Humidity  
   Optical  
   Thermal  
   **Mechanical**
2. A potentiometric displacement sensor utilizes a wire of \_\_\_\_\_\_\_\_\_\_with a wiper in electrical contact with the wire.

**high resistance**

high capacitance

high conductance

low capacitance

1. \_\_\_\_\_\_\_\_\_\_ sensors rely on a change of capacitance, resistance, inductance, or reluctance.  
   **a) Point**  
   b) Humidity  
   c) Proximity  
   d) Thermal
2. Variable inductance is achieved by the utilization of \_\_\_\_\_\_\_\_\_\_ core in the shape of a rod which is wraped by a hollow coil of wire.  
   a) Ferrimagnetic  
   **b) Ferromagnetic**  
   c) Paramagnetic  
   d) Diamagnetic
3. The \_\_\_\_\_\_\_\_\_\_ factor is the relative change in resistance divided by relative change in length i.e., the definition of strain.  
   a) Screw  
   **b) Gauge**  
   c) Pit  
   d) Kraft
4. Strain \_\_\_\_\_\_\_\_\_\_\_ could be mounted on diaphragms to measure pressure; this method has been miniaturized onto integrated circuits.  
   a) Sensors  
   b) Lobes  
   c) **Gauges**  
   d) Gears
5. The \_\_\_\_\_\_\_\_\_\_ of a heated metal filament depends on the gas pressure since the gas molecules could conduct heat from the filament.

pressure

**temperature**

color

chemical stability

1. The synchronous frequency f0 of the SAW device with phase velocity vp and pitch p as

f = v+p

f = v-p

f = v\*p

**f = v/p**

1. Which of the following material cannot be used as Hall effect sensors

**Silicon Carbide (SiC**)

Gallium arsenide (GaAs)

Indium antimonide (InSb)

Indium arsenide (InAs)

1. Which of the following is considered as powerless sensor

Photodiodes

SAW sensors

**Capacitive pressure sensors**

Inductive Sensors

1. Most of the materials exhibit gauge factor value approximately

**2**

4

6

8

1. Gauge (Se) factor can be calculated as

**1+2\*poisson’s ratio**

Poisson’s ratio+2

Poisson’s ratio-2

1-2\*Poisson’s ration

1. Which of the following statement is not correct about the longitudinal waves

The medium contents oscillate in the direction of wave propagation

Alternate physical compression and expansion of the medium with certain frequencies

A medium is required for the acoustic wave propagation

**It will propagate in vacuum as light**

1. Which one of the following is not a type of radiation sensor

Scintillation detector

Gaseous detector

**SAW detector**

Semiconductor detector

1. If the plate separation for a capacitor is 2.0x10-3 m, determine the area of the plates if the capacitance is exactly 1 F.

A = 3.3x10^8 m^2

**A = 2.3x10^8 m^2**

A = 2.3x10^10 m^2

A = 3.3x10^10 m^2

1. Determine the amount of charge stored on either plate of a capacitor (4x10^-6 F) when connected across a 12 V battery.

**Q = 48x10^-6 C**

Q = 60x10^-6 C

Q = 36x10^-6 C

Q = 24x10^-6 C

1. The typical velocities are \_\_\_\_\_\_ for longitudinal waves and \_\_\_\_\_\_\_for transverse waves.

**a) 6000 m/s & 3000 m/s**

b) 3000 m/s & 6000 m/s

c) 6000 m/min & 3000 m/min

d) 3000 m/min & 6000 m/min

1. What is the velocity when the electric field is 5V/m and the magnetic field is 5 A/m (where E=VB)

**a) 1m/s**

b) 25m/s

c) 0.2m/s

d) 0.125m/s

1. Group1 : (1) Giant Magnetoresistance (2) Tunnel Magnetoresistance (3) Colossal magnetoresistance

Group 2: (a) Alternating ferromagnetic layer in between insulator (b)Alternative metallics and ferromagnetic layers (c) La(1-x))MMnO3+8

Match the parameters of Group 1 with Group 2.

a) 1-a, 2-b, 3-c

b) 1-c, 2-a, 3-b

**c) 1-b, 2-a, 3-c**

d) 1-a, 2-c, 3-b

1. According to the design rule of SAW sensor, the wavelength f is found to be 400 micro meter ; then is what could be the finger width value?

**100 micro meter**

200 micro meter

300 micro meter

400 micro meter

1. \_\_\_\_is not a piezoelectric and thus has to be combined with a piezoelectric material such as \_\_\_\_\_\_in order to fabricate a discrete device.

**Diamond & AlN**

AlN & Diamond

ZnO & AlN

ZnO & Diamond

1. \_\_\_\_\_\_\_\_\_\_ sensors is a type of transformer and are the basis of the prevalent Linear Variable Differential Transformer (L.V.D.T). The signal is easily conditioned to give out a D.C. voltage that in linearly proportional to point over part of the range of motion of the core.  
   a) Speed  
   b) Temperature  
   c) TIR  
   **d) Reluctance**
2. If a fluid is at rest, one refers to static \_\_\_\_\_\_\_\_\_ If a fluid is in motion, one refers to dynamic \_\_\_\_\_\_\_\_\_ which is a function of the motion of the fluid.  
   **a) Pressure**  
   b) Gravitational force  
   c) Viscosity  
   d) Density
3. In magneto resistive sensors, the relation between the field and current is \_\_\_\_\_\_\_\_\_to B for most configurations

Double the value

**Proportional**

Inertly proportional

Half of the value

1. Which sensor is used in mobile phones?  
   **Capacitive touch sensor**Temperature sensor  
   Humidity sensor  
   Weight sensor
2. Which touchscreen is coated with a transparent material?  
   a) Capacitive touchscreen  
   b) SAW  
   c) Infrared  
   d) **Resistive touchscreen**
3. Silicon based photodetectors works with in the wavelength region of

**190 – 1100 nm**

400 – 1700 nm

800 – 2600 nm

400 – 14000 nm

1. Thermal detectors detect light by \_\_\_\_ in temperature when light absorbed

**Rise**

Rapidly decline

Unalter

Slowly decline

1. Photon detectors work by creating \_\_\_\_\_\_\_\_\_\_\_ on absorption of the incident radiation

electrons only

holes only

heat energy

**electron-hole pair**

1. \_\_\_\_\_\_\_\_\_based photodetectors works with in the wavelength region of **400 – 1700 nm**

**Germanium**

Silicon

InGaAs

MoS2

1. InGaAs photodetectors works with in the wavelength region of

90 – 1100 nm

400 – 1700 nm

800 – 2600 nm

**400 – 14000 nm**

1. Which of the following is incorrect according to Photodiodes

Low cost

Quick response to light

**It provides Non-linear response**

High operational speed

1. \_\_\_\_\_\_\_ of the ability of materials to convert nuclear radiation in to light

**Scintillating detection**

Semiconductor detections

Thermal detection

Plasmonic detection

1. Energy per electron hole pair of Si is

**3.61 eV**

2.98 eV

4.43 eV

6.5 eV

1. Energy per electron hole pair of Ge is

3.61 eV

**2.98 eV**

4.43 eV

6.5 eV

1. Energy per electron hole pair of CdTe is

3.61 eV

2.98 eV

**4.43 eV**

6.5 eV

1. Energy per electron hole pair of HgI2 is

3.61 eV

2.98 eV

4.43 eV

**6.5 eV**

1. In an LDR resistance decreases with \_\_\_\_\_ light intensity

**Increasing**

Decreasing

Constant

For both increasing and decreasing

1. Photodiode detects \_\_\_\_\_

**Light**

Sound

Current

Pressure

1. \_\_\_\_\_\_is most widely used variable band gap semiconductor for IR detection

TiO2

**HgCdTe**

ZnO

Polymer

1. \_\_\_\_\_\_\_\_, linear arrays of photoconductive detectors has been produced in large quantities

First generation

Second generation

Third generation

Last generation

1. Progress in IR technology is connected with \_\_

conductor IR detectors

semiconductor visible detectors

**semiconductor IR detectors**

conductor visible detectors

1. Approximate career concentration per cubic centimeter of Silicon and copper are respectively

1.4 x 10^9 and 8.4x10^21

8.4x10^21 and 1.4 x 10^9

1. **10^9 and 84x10^21**

84x10^21 and 14 x 10^9

82. I. IR region – HgCdTe, PtSi ; II. UV region – ZnO, TiO2; III. Visible region – CdS, Doped Silicon. Which are all correct among the above matches?

I only

**I & II only**

I & III only

I, II & III

1. Which one of the following doping formula can be used in avalanche diode? \*

P+ & n

**P++ & n+**

P & n++

P+ & n+

1. Energy per electron hole pair of CdTe is

3.61 eV

2.98 eV

**4.43 eV**

6.5 eV

1. In second generation photovoltaic photodetectors are

One dimensional rods

**Two dimensional arrays**

Linear arrays

Organic Crystals

1. Which of the following is not a type of radiation detectors?  
   HgCdTe sensor  
   IR Detector  
   Semiconductor detector  
   **Flame emission detector**
2. In HgCdTe detection, \_\_\_\_arrays the I-V characteristics are usually close to ideal

Short wave

**medium wave**

Long wave

Super long wave

1. In Medium wave detector of IR detection, the absorber need only \_\_\_\_\_\_\_

4-5 nm thick

**40-50 nm thick**

400- 500 nm thick

4000-5000 nm thick

1. To sort the objects, verify the position and recognize the dyes, which detection technique is required

Thermal detection

**Colour detection**

Chemical detection

IR detection

1. \_\_\_\_\_\_diode doesn’t require reverse bias and as a result is more suitable for low light applications

PIN

**PN**

Zener

Crystal

1. Reverse bias required by the \_\_\_\_\_\_\_\_\_\_ diode introduces a noise current

**PIN**

PN

Zener

Crystal

1. Typical CdS has a band gap value of \_\_\_\_\_\_\_

3.2 eV

1.2 eV

2.4 eV

4.2 eV

1. The conduction resistance is defined by

A/kL

**L/kA**

kL/A

kA/L

1. \_\_\_\_\_\_\_\_\_ is the mode of energy transfer between solid surface and the adjacent liquid or gas that is in motion

**Convection**

**R**adiation

Conduction

Reflection

1. Platinum based thermal detectors used to detect thermal range of \_\_\_\_ (deg K)

**250 and above**

100 and above

50 and above

Less than 50

1. Most stable mixed metal oxides are \_\_\_\_\_

Zn-Fe-Cu

Zn-Fe-Co

Zn-Ni-Co

**Mn-Ni-Co**

1. Which is helpful to eliminate the effects of unknown offset and gain

**Three signal technique in a linear system**

Two signal technique in a nonlinear system

Closed loop control in a linear system

Two signal technique in a nonlinear system

1. Application of period-modulated output signal of\_\_ for 3-phase mode

UTI, Liquid level sensor

UTI, Humidity sensor

UTI, Position sensor

**UTI, Liquid level & Humidity & Position sensor**

1. In bulk micromachining, the \_\_\_\_\_\_usually measured in dimensions of \_\_\_\_\_\_\_\_\_\_ per unit time

etch rate, depth  
**etch rate, length**  
doping, width  
None of the above are matching

1. In anisotropic etching process of\_\_\_\_\_\_, which plane etches the fastest

Silicon, {111}  
**Silicon , {100}**  
Zinc Oxide, {101}  
Zinc Oxide, {100}

1. Which etching process is typically done by \_\_\_\_\_\_\_\_with heavy ions in the presence of an energetic plasma

Wafer, Anisotropic etching

Ions, plasma etching

**Wafer, reactive ion etching**

Wafer, plasma etching

1. What is the cost estimation for testing and packaging in Microsystems from the total cost?

**40% to 75%**  
20% to 60%  
30% to 70%  
10% to 60%

1. \_\_\_\_\_\_\_layer deposition, \_\_\_\_\_\_\_method is utilized in LIGA process

**Seed layer, electroplating**

Structural layer, electrospinning

Sacrificial layer, electroplating

Buffer layer, electrospinning

1. \_\_\_\_\_\_\_is the source of \_\_\_\_\_\_\_, which is used in the LIGA technology

Radioactive isotopes, X-rays

Stars, UV rays  
**Synchrotron radiation, X-rays**

Plasma sources, UV rays

1. A microfluidic channel is about the same width as a human hair which is \_\_\_\_\_\_\_\_

10 micrometer

50 micrometer

100 micrometer

70 micrometer

1. Which fluids have non-linear relationship between shear stress and shear strain

Newtonian fluids

Non-newtonian fluids

Ideal fluids  
Ideal plastic fluids

1. If fluid particles move along irregular paths means, what is the flow type?

Laminar flow

Turbulent flow

Steady flow  
None of the above

1. Which device control the fluid flow direction in microfluidics system

Pump  
Valve  
Regulator  
None of the above

1. Which one is the application of molecules

Electric switches

Storage

Transmission

Above all

1. Which one is based on the distance-dependent electron tunnel current between a peak and a surface

STM

TEM

HRTEM

AFM

1. What kind of wafers should be used to achieve high quality ultra-thin film with high crystallinity

Polycrystalline

Mono-crystalline

Transparent

Amorphous

1. What the pressure range in metal-organic chemical vapour deposition technique

2 kPa to 100 kPa

10^-1 Pa to 103 Pa

4 Pa to 8 Pa  
None of the above

1. Which parameter in molecular beam epitaxy technique should be taken care during ultra-thin film deposition

Orifice diameter

Wall thickness

Vapour pressure

Above all

1. Which one is III-V semiconductor

ZnO  
ZnS  
GaAs  
None of the above

1. Physical and chemical properties of clusters are significantly depend on \_\_\_\_\_\_\_\_\_\_\_

Particles shape  
number of particles in the cluster

particles arrangement  
None of the above

1. Top down approach means

Starting with small piece

Starting with larger piece

self-assemply  
None of the above

1. Which cluster have central pair forces

Metal cluster  
cluster of ionic materials

network cluster  
Van der Waals cluster

1. Which bonding leads to the formation of atomic network in clusters

hydrogen

metallic

covalent  
Van der waals

1. Which of the following is not a static characteristic of a sensor

Sensitivity

Linearity

Hysteresis

Conductance

1. In a piezoelectric crystal,

Electrical energy is converted into mechanical energy

Mechanical energy is converted into electrical energy

Chemical energy is converted into mechanical energy

Electrical energy is converted into chemical energy

1. SAW stands for

Surface attenuated wave

Surface acoustic wave

Surface activated wave

Surface actuated wave

1. Lap-on-Chip is a

Microfludic device

Microprocessor

Microcontroller

Microresistor

1. Which one of following techniques uses a light sensitive polymer,

LIGA  
Etching

Photolithography

Silicon micromachining

1. Which of the following process is involved in LIGA

Molding  
Drop casting

Lithography

Electroplating

1. Pick the odd man out which is not related to self-organized nanostructures

Micelles  
lipid bilayers

Colloids  
Carbon nanotubes

1. The micro controller is used to measure the \_\_\_\_\_ from UTI

Amplitude modulated signal

Period modulated signal

Phase modulated signal

Above all

1. In general, biological recognizing element is known as,

Analyte

**Ligand**

Transducer

Support

1. Which of the following is not come under the category of bioreceptors?

Enzyme

Cells

**pH Electrode**

DNA

1. Bio receptor in common glucose sensor is

Oxygen

Gluconic acid

**Glucose oxidase**

H202

1. A \_\_ sensor measures gluconic acid, a reaction product of glucose

Oxygen gas sensor

**pH sensor**

peroxidase chemical sensor

Visible sensor

1. When biorecognition causes change in dielectric constant which of the transducer is highly useful?

Thermometric

Conductimetric

**Electrical capacitance**

1. Piezoelectric

Amperometry biosensor is based on direct change in

pH

**H2O2/O2**

metal ions

mass

1. \_\_\_ offer a surface that is sensitive to change in mass

**QCM**

SAW device

Biochemicals

Insulators

1. Enthalpy of a chemistry is measured with

**Thermometric transducer**

Enzyme thermistor

Conductance transducer

Electrical capacitance transducer

1. Monitoring solution conductance applied as a method of determining the reaction rates in

Thermometric transducer

Enzyme thermistor

**Conductance transducer**

Electrical capacitance transducer

1. Silicon crystals, called quartz crystals measure changes up to

Milligram

micrograms

nanogram

**picogram**

1. Van der Waals force is a method comes under the \_\_\_\_\_\_ immobilization

**Absorption**

Entrapment

Cross linking

Covalent bonding

1. Semipermiable membrane falls under which of the following immobilization procedure

Absorption

**Entrapment**

Cross linking

Covalent bonding

1. Glutaraldehyde bis-isocyanate derivatives follows which of the following immobilization procedure

Absorption

Entrapment

**Cross linking**

Covalent bonding

1. Chemicals strongly have interaction with insoluble supports under which of the following method of immobilization

Absorption

Entrapment

Cross linking

**Covalent bonding**

1. Commercial biosensor developed in the year of

1960

**1962**

1964

1966

1. Lab on a Chip requires

More time

**Less cost**

More sample

Large space

1. In Lab on a Chip construction Silicon been used commonly as a

Support

**Substrate**

Analyte

Receptor

1. Polydimethylsiloxane is been used as substrate in Lab on a Chip technology for its

Abundance

**Flexibility**

Cheaper

Transparency

1. Microfluidic systems require

Micro pumps only

Micro pumps and microchannels

Microchannels and microvalves

**Micro pumps and microvalves**

1. \_\_\_\_\_\_exert pressure forces on the fluid through one or more moving boundaries

Micro pumps

Macro pumps

**Displacement pumps**

Ion pumps

1. \_\_\_\_\_ causes the piezoelectric component to expand and contract along the horizontal direction

DC voltage

AC voltage

Mechanical pressure

Laser photons

1. Capillary electrophoresis obtains \_\_\_\_\_\_\_ strategy in microfluidics

Mixing

**Separation**

Valving

Pumping

1. Many analog sensors cannot be interfaced with \_\_\_\_\_

In a Lab on a Chip

the microfluidic devices

**Low Cost**

Handheld feature

1. Which one is the characterization parameter of Biosensors?

**Reproducibility**

Transduction

Piezoelectricity

Immobilization

1. In the……. technique, the bioreceptor remains in solution inside a compartment bounded by ……. a which only allows through small molecules.

Crosslinking, Semi-permeable membrane

**Confinement, Semi-permeable membrane**

Doping, Semi-permeable membrane

Inclusion, Semi-permeable membrane

1. Which one is a separation method of (bio)chemical substances?

Inclusion

Etching

Filtration

**Capillary electrophoresis**

1. The …… provides an input to a controller with the desired strategy in its ……

Controller, Interface

Transistor, Memory

CMOS, Memory

**Sensor, Memory**

1. Choose the correct statement in context of Three-Signal-Technique.

It is a complete front end for many types of passive sensors, such as resistive, resistive bridge and capacitive sensors.

**The three-signal technique is a technique to eliminate the effects of unknown offset and unknown gain in a linear system.**

It is ideal for use in smart microcontroller-based systems.

Constructive and connective engineering encompasses the totality of process engineering and design tools that are needed for the implementation of microsystems

1. How the high accuracy in UTI can be achieved?

**By operating it in auto calibration**

By signal conversion

By removing the errors

By referencing the signals in an identical way

1. A ………… system takes the ……. from a sensing element and converts it into a more suitable form for further processing

UTI, Output

Signal condition, Input

UTI, Input

**Signal conditioning, Output**

1. a) Bioreceptor must be intimate contact with the transducer; b) The sensitive element is usually immobilized on artificial substrate. About the given statements which of the listed answer is valid?

Both a) and b) are correct

**Both a) and b) are incorrect**

Only a) is correct

Only b) is correct

1. Optimal orientation of receptor will not result in

Greater affinity of the antigen

Increased sensitivity of the affinity biosensors

High reproducibility

**Less sensitivity**

1. Adsorption is simply interaction between \_\_\_ and\_\_\_\_

Ligand and transducer

Support and analyte

**Bioreceptor and support**

Analyte and transducer

1. Which of the following match is incorrect?

QCM- piezoelectric transducers

**Penicillinase -FET transducer**

Migration of ions – conductimetric transducer

Chemical reactions – thermometric transducer

1. Which of the following is correct statement?

Bioreceptor immobilized vicinity the signal processor

**Bioreceptor immobilized in the vicinity of the transducer**

Immobilization should be done by both physical and chemical entrapment

Chemical attachment doesn’t involve with the covalent bonding

1. Which of the following statement is false?

Selectivity is the most important feature

**Selectivity is the ability of bioreceptor to detect any analyte**

Best example for selectivity is antigen antibody interaction

Selectivity generally has to be measured in a mixture of analyte

1. A biosensor utilizes a biological recognizing element that senses the present of \_\_\_\_\_\_\_and creates a physiochemical response that is converted by a transducer in to a\_\_\_\_\_\_\_.

**Analyte, Signal**

Signal, Analyte

bias, Support

Support, bias

1. MEMS is an integration of mechanical elements, sensors, ------- and electronics on a single silicon platform.

cantilever

**actuators**

bolometer

lenses

1. Name the pattern transfer process in the microfabrication technique.

lithography

bonding

diffusion

sputtering

1. What is commonly used material for MEMS device fabrication?

Copper

Cadmium

silicon

germanium

1. The process by which the substrate is carved to form the structures or devices is -------.

Deposition

surface micromachining

nucleation

bulk micromachining

1. Which of the following is a correct statement?

oxidation is a subtractive process

RIE is a dry etching process

etching is a pattern transfer process

PMMA is a negative resist

1. Which is the following is an etchant for silicon?

KOH

NaCl

HF

HCl

1. Sputtering is a ------- process

CVD

PVD

etching

lithography

1. Which is the following is a method to implement etch stop in wet etch process?

drain the etchant from the bath

pull out the substrate

doping selective etching

introduce other chemicals

1. Crystal direction dependent etching is known as ----------.

isotropic etching

dry etching

plasma etching

anisotropic etching

1. In LIGA process the galvanoforming refers to ----------.

defining metallic parts

moulding

etching

deposition

1. Transportation of fluids and mixtures at micron scale level is called --------.

NEMS

microfluidics

integrated fluid sensor

smart sensor

1. A water drop on a surface with a contact angle greater than 90 degrees indicate what?

hydrophilic surface

electrowetting surface

hydrophobic surface

reflective surface

1. Which process is not typically used for polymer microfluidic chips?

casting

etching

molding

deposition

1. What type of flow happens due to surface tensions at the air/liquid/solid end of a small channel?

capillary flow

laminar flow

unidirectional flow

turbulent flow

1. What property of liquid commonly results in exerting a pressure on fluids in microchannel?

compression

viscosity

resistivity

surface tension

1. Steady flow of Fluid particles move along smooth paths in layers is under

Turbulent Flow

**Laminar flow**

Deep flow

Planer flow

1. Measure of flow turbulence is known as

Avogadro number

**Reynolds number**

Pascal number

Fourier number

1. Unsteady flow of fluid particles move along irregular paths in layers is under

**Turbulent Flow**

Laminar flow

Deep flow

Planer flow

1. Silicon micro-machined ink jet printer nozzles in 1978 was introduced by

IBM

Motorola

**Hawlett-Packard**

Seagate

1. Photoresist generally applied by

**Spin coating**

Electroplating

Self-assembling

Micro-machining

1. \_\_\_\_temperature facilitates \_\_\_\_thickness in thermal oxidation

**High, more**

Low, more

High, less

Low, less

1. In general, \_\_\_\_\_\_\_etching is more directional and anisotropic

**Physical**

Dry chemical

Natural

Wet chemical

1. Planting the dopant atoms into the host semiconductor is known as

**Doping**

Etching

Craving

Compositing

1. High precision aspect ration LIGA require

UV – A rays

**X-ray**

IR rays

UV – B rays

1. The effect of the light is to change the ………. of the resist in a solution called the…………..

**Solubility, Developer**

Developer, Solubility

Polarity, Lithography

Lithography, Polarity

1. In which of the following processes the material to be deposited starts out as a solid and is transported to the substrate surface where a film is slowly built up?

Photolithography & Sputtering

**Sputtering & Evaporation**

Thermal oxidation & wet etching

Plasma etching & Doping

1. Which of the following statement is correct?

**The higher the temperature, the greater the oxidation rate (amount of oxide growth / time)**

The lower the temperature, the greater the oxidation rate (amount of oxide growth/time)

The greater the temperature, the lower the oxidation rate (amount of oxide growth/time)

The lower the temperature, the lower the oxidation rate (amount of oxide growth/time)

1. Name the fabrication technique for depositing films on top of the substrate and selectively remove parts of deposited films to create MEMS devices.

Bulk micromachining

Etching

Reactive Ion Etching

**Surface micromachining**

1. An etching proceeding in at different rates in different directions is called……. Whereas an etching proceeding at the same rate in all directions is called…….

Anisotropic etching, Reactive ion etching

Isotropic etching, Anisotropic etching

Plasma etching, Reactive ion etching

**Anisotropic etching, Isotropic Etching**

1. Which one is an advantage of microfluidics?

**Small physical and economic footprint**

Controlled grain size

High-aspect-ratio

Used to produce patterns in a very thick layers of photoresist

1. …… are the devices to set fluids into motion and ….. are used to control this motion.

Valves and Pumps

Plug valves and Threshold valves

**Pumps and Valves**

Hard membrane valves and Soft membrane valves

1. Which one is an important technique to preapre organic films?

**Langmuir-Blodgett method**

Chemical beam epitaxy

Molecular beam epitaxy

Atomic layer epitaxy

1. Choose the correct statement in context of Van der Walls clusters.

Many metals have non-close-packed structures because the interatomic forces are partially directional.

Covalent bonding leads to the formation of atomic networks in clusters of materials like Si, Ge and C

Covalent bonding leads to the formation of atomic networks in clusters of materials like Si, Ge and C

**The interactions between inert gas atoms are weak and can be described accurately by central pair forces.**

1. Which of the following is a chemical vapour deposition method?

**Metal-Organic Vapour Phase Epitaxy**

Molecular Beam Epitaxy

Atomic layer epitaxy

Photolithography

1. Choose a set of examples of 2D structure or quantum well.

Spheres & Clusters

**Thin films & Plates**

Bulk nanomaterials

Nanofibers, wires & rods

1. Building something by starting with a larger piece and carving away material (like a sculpture) is called?

**Top-down approach**

Metal clusters formation

Bottom-up approach

Making of ultrathin films

1. Clusters are agglomerates consisting of about …… atoms.

10- 10000

0-20000

**10-1000**

30-10000

1. Which of the following is based on the distance-dependent electron tunnel current between a peak and a surface?

**Scanning tunnel micro- scope (STM)**

3D Sensors

MEMS Devices

Integrated Circuits (ICs)