ELEX ESE Regular (VIIIth Sem/ CBCGS-H) October2020

Microelectromechanical Systems(MEMS) Technology

SEM VIII(CBCGS-H)

SAMPLE QUESTION SET for MEMS Technology

Note: MCQ comprises of 1 marks and 2 marks questions

1 ._____ is the unintentional adhesion of microstructural structures with a large surface-area-to-volume ratio when restoring forces are not able to overcome the interfacial forces such as capillary, electrostatic, van der Waals, and residual stress.

a. Creep
b.Stiction
c.Friction
d.Actuation

2. _____ defined as a change in electrical resistance of solids when subjected to stress fields.

a. Piezoelectric
b. Photoresist
c.Piezoresistance
d.none

3. _____defines the change in resistance as a function of the ambient temperature.
a.TCR
b.Piezoresistance
c.Thermal resistance
d.None

4. _____is the change in the electrical resistivity of a solid induced by an applied mechanical stress.
a.Piezoresistance
b.Electromechanical stress
c.TCR
d.stiffness

5.In the _____, a change in the cantilever's z-displacement indicates a change in load or intrinsic stress.

a. Dynamic mode
b.Static mode
c. Pseudo static
d. Pseudo Dynamic

6.In which cantilever mode,it takes benefit of the bimetallic effect that leads to a bending of a bimaterial micro cantilever with change in temperature.

a) Static mode
b) Dynamic mode
c) Heat mode
d) None

7.Hall effect sensors are an application of _____ law.

a. Ampere's
b.Gauss's
c.Lorentz's
d.Lenz's

8.The following are /is Characteristics of a mechanical (micro.actuator)
a. Stroke
b. Force/torque
c. Stiffness
d. Hysteresis

9. The wet etching process is _____

a. isotropic
b. anisotropic
c. isotropic for few materials
d. isobaric process

10. Following acts as detector in Optical sensor

a Light emitting diode
b Photo diode
c Transistor
d All of the above

11. First material known to be used by man
a Cotton
b Bronze
c Iron
d Rock

12. First metal known to be used by man
a Iron
b Bronze
c Silver
d Aluminium

13. Which one of the following is not basic component of Materials Science?
a Cost
b Properties

c Structure
d Performance

14. Figure out the odd statement about ceramics in the following
a Good insulators of heat and electricity
b Usually less desire than metals
c Ductile in nature
d Contains both metallic and nonmetallic elements

15. Pick the composite from the list
a Wood
b Steel
c Nylon
d Mica

16. Not an example for actuator
a Optical fiber
b Shape memory alloys
c Magneto-strictive materials
d Electro-/Magneto-rheological fluids

17. Strong and ductile materials
a Polymers
b Ceramics
c Metals
d Semiconductors

18. Presently most used metal in the world
a Aluminium
b Gold
c Steel
d Silver

19. Detrimental property of a material for shock load applications
a High density
b Low toughness
c High strength
d Low hardness

20. Democratic material
a Diamond
b Titanium
c Iron
d Gold

21. Which of the following software can be used to make a schematic design of your

microfabricated sensor?

a SolidWorks
b PSpice
©. ProE
d MATLAB

22. Change in output of any sensor with respect to change in input is expressed as
a.Specificity
b.Sensitivity
©.Threshold limit
d.Gauge Factor

23. Lithography process is used to pattern:
a Metal and semiconductor layers
b Metal and insulating layers
© Semiconductor and insulation layers
d Metal, Semiconductor and insulation layers

24. Smallest change in input which a sensor can detect and express as output:
a Precision
b Cut-in-voltage
© Resolution
d Threshold

25. The following main dynamic characteristic(s) is usually considered in Mechatronics application of sensors.
a Response time
b Rise time
c Time constant
d All of the above

26. The following is (are) type(s) of Hall Effect sensors.
a Linear Hall Effect sensor
b Threshold Hall Effect sensor
c Both a and b
d None of the above

27. Following is (are) true for Hall Effect sensors.
a They can operate as switches of high frequency
b They cost less than electromechanical switches
c They are free from contact bounce problem
d All of the above

28- A piezo-electrical crystal generates voltage when subjected to ____ force.
a Electrical
b Mechanical
c Gravity
d All of the above

29-Hall Effect sensors are used in
a Flow meter
b Fuel level indicator
c Both a and b
d None of the above

30-Any radiation of appropriate wavelength fall on the depletion layer of p-n junction develops a potential difference between the junction' is working principle of
a Hall Effect sensor
b Proximity sensor
c Light sensor

d All of the above

31-Following type of sensors are used to generate information in object grasping and obstacle avoidance.
a Hall Effect sensor
b Proximity sensor
c Light sensor
d Optical sensors

32-Inductive ---------- sensors can be effective only when the objects are of _____ materials.
a proximity, Ferro magnetic
b piezo,Diamagnetic
c proximity,Paramagnetic
d proximity ,nonmagnetic

33. Why micro-heater is fabricated in drug screening device?
a. At elevated temperature sensitivity increases
b.To maintain normal human body temperature on the chip
c. Matrigel is stable only at elevated temperature (~ 320K.)
d. cost consideration

34. The following are /is Characteristics of a mechanical (micro.actuator
a Stroke
b Force/torque
© Stiffness
d Hysteresis

35-A beam is a structural member which is subjected to
a Axial tension or compression
b Transverse loads and couples
© Twisting moment
d.No load, but its axis should be horizontal and x-section rectangular or circular

36-Which of the following is not covered under Mechanical energy domain?
a Distance
b Latent heat
c Force
d Size

37-Which of the following form the basis of Electrical domain?
a Current
b Resistance
c Inductance
d All of the above

38-The sensors are classified on the basis of
a Functions
b Performance
c Output
d All of the above

39-The following is not a static performance parameter to be looked into before selecting a parameter.
a Range
b Deflection

c Stability
d Error

40-The following main dynamic characteristic(s) is usually considered in Mechatronics application of sensors.
a Response time
b Rise time
c Time constant
d All of the above

41-The ability to give same output reading when same input value is applied repeatedly is known as
a Stability
b Repeatability
c Accuracy
d Sensitivity

42-It is the ability of the sensor to indicate the same output over a period of time for a constant input.
a Stability
b Resolution
c Error
d Impedance

43-It is the time required to come to an output value within the specified error level.
a Response time
b Rise time
c Settling time
d None of the above

44-Following is the coded output.
a Modulation of amplitude
b Modulation of frequency
c Modulation of pulse width
d All of the above

45-Following is not an example of transducer.
a Analogue voltmeter
b Thermocouple
c Photo electric cell
d Pneumatic cylinder

46-A piezo-electrical crystal generates -------- when subjected to ____ force.
a Voltage,Electrical
b Voltage, Mechanical
c Current,Gravity
d Current, non electrical

47. Weibull distribution provides usable mathematical descriptions of……. rate:
a· Reliability & Failure Rate
b· Passing rate & Reliability
c· Failure rate & Flat rate
d· Reliability & Flat rate

48. ……of the beam is inversely proportional to the _____ of the beam.
a. stiffness, Slope
b. stress,Support reaction

c. stiffness, Deflection
d. length, Load

49. Dynamic deflection of the pulsed-voltage activated piezoelectric diaphragm can generate a pressure wave to eject the ink out of the nozzle
a Deflection, piezoresistive
b Refraction, piezoelectric
c. deflection, piezoelectric
d refraction, piezoelectric