Assignment 11

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2019-04-17, 23:59 IST.

1) Electrons in an electron beam (EB) unit is emitted by:
   a. Thermo-ionic emission
   b. Photo-ionic emission
   c. Electro-optic emission
   d. Thermo-electric emission

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   a.

2) Electrons in EB unit are emitted from:
   a. Anode
   b. Diode
   c. Cathode
   d. Positive electrode

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   c.
Beam deflection or manipulation in EB unit is done by:

a. Electron-optic field
b. Magnetic field
c. Electrical field
d. Capacitive field

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) Emitted electron flux in EB unit is:

a. Proportional to time
b. Proportional to heat flux
c. Proportional to temperature
d. Proportional to magnetic field

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

5) Vacuum level in the electron beam column in EB unit typically is:

a. Better than $10^{-1}$ mbar
b. Better than $10^{-2}$ mbar
c. Better than $10^{-3}$ mbar
d. Better than $10^{-6}$ mbar

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

6)
Energy deposition profile as a function of depth following electron beam irradiation of a sol EB unit is:

a. Exponential
b. Gaussian
c. Linear
d. Sinusoidal

No, the answer is incorrect.
Score: 0
Accepted Answers: 
b.

7) Ultra-high vacuum in the electron beam column of an EB unit helps in:

a. Minimizing undue oxidation and contamination
b. Preventing easy dissipation/loss of energy of emitted electrons
c. Ensuring adequate life of the electron emitter
d. All of above

No, the answer is incorrect.
Score: 0
Accepted Answers: 
d.

8) Identify what is NOT emitted when electron beam interacts with the target?

a. Secondary electrons
b. Ultrasonic wave
c. Back scattered electrons
d. Continuous X-ray

No, the answer is incorrect.
Score: 0
Accepted Answers: 
b.

9)
Name the parameter that can be controlled independently during electron beam irradiation EB unit:

a. Beam current and interaction time
b. Beam focus position
c. Beam power density
d. All of above

No, the answer is incorrect.
Score: 0
Accepted Answers: d.

10) Identify the material property that is NOT important to determine the resultant thermal profile of the target during electron irradiation in an EB unit:

a. Crystal structure
b. Melting point
c. Specific heat
d. Thermal conductivity

No, the answer is incorrect.
Score: 0
Accepted Answers: a.

11) For deep penetration welding in an EB unit, the electron beam focus should:

a. Lie above the substrate surface
b. Lie below the substrate surface
c. Coincide with the substrate surface
d. Not be focused

No, the answer is incorrect.
Score: 0
Accepted Answers: d.
12) Difficulties arise in fusion joining of dissimilar metals primarily due to:
   a. Differences in thermal conductivity
   b. Poor intermixing of two metals
   c. Formation of intermetallic phases
   d. Incomplete melting of one of the sides

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   c.

13) Adequate shielding is essential around electron beam unit to protect from:
   a. Heat radiation
   b. Electrical shock
   c. Electron damage
   d. X-ray radiation

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   d.

14) Electron beam is ideally suited for deep penetration welding because of its:
   a. High power density
   b. Gaussian energy deposition profile
   c. High temperature generation capability
   d. Short wavelength

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   b.

15)
Which of the following is NOT possible using electron beam?

a. Annealing of semiconductor
b. Transformation hardening
c. Surface melting and cladding
d. Physical vapor deposition

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

16) Ion implantation unit is a high vacuum chamber comprising:

a. Ion source and accelerator
b. Mass spectrometer and neutral atom trap
c. Target chamber, ion injection and X-Y manipulator stage
d. All of above

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

17) Usual (not maximum) acceleration voltage range used in an ion implanter is:

a. 100-5000 keV
b. 10-500 keV
c. 1-50 keV
d. 0.1-5.0 keV

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.
Typical dose (ions/cm²) in ion implantation varies in the range:

a. $10^7 - 10^{12}$ ions/cm²
b. $10^8 - 10^{15}$ ions/cm²
c. $10^{11} - 10^{18}$ ions/cm²
d. $10^{14} - 10^{21}$ ions/cm²

No, the answer is incorrect.
Score: 0
Accepted Answers: c.

Typical ion flux (ions/cm²/s) in ion implantation varies in the range:

a. $10^6 - 10^{12}$ ions/cm²/s
b. $10^{12} - 10^{14}$ ions/cm²/s
c. $10^{14} - 10^{16}$ ions/cm²/s
d. $10^{16} - 10^{18}$ ions/cm²/s

No, the answer is incorrect.
Score: 0
Accepted Answers: b.

Material property that is NOT affected by ion implantation of a Si wafer is:

a. Toughness
b. Conductivity
c. Diffusion coefficient
d. Defect density

No, the answer is incorrect.
Score: 0
Accepted Answers: a.
Selection or screening of useful ions from the ion beam generated by mass spectrometer is based on the principle of:

a. Mass separation
b. Velocity separation
c. Magnetic separation
d. Electrical separation

No, the answer is incorrect.
Score: 0
Accepted Answers: c.

22) Implanted dose can be indirectly estimated by measuring the:

a. Acceleration voltage
b. Magnetic induction flux
c. Beam current
d. Composition profile

No, the answer is incorrect.
Score: 0
Accepted Answers: c.

23) Implanted ion deposition profile in ion implantation is:

a. Gaussian with peak near the surface
b. Gaussian with peak deep inside the sample
c. Exponential decay with peak at the surface
d. Linear decay with peak at the surface

No, the answer is incorrect.
Score: 0
Accepted Answers: a.
Usually ion beam is incident not normally but at a shallow angle of 6-8 degree (to the normal)

a. Reduce velocity
b. Improve penetration
c. Avoid ion channeling
d. Ensure better solubility

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

25) Diffusion of implanted species inside the sample in ion implantation occurs by:

a. Thermal diffusion
b. Mechanical diffusion
c. Electro-migration
d. Ballistic diffusion

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.