Examination: **M.Tech Nanoscience and Technology**

**SECTION 1 - SECTION 1**

**Question No.1**

If an atom leaves its site and dissolves interstitially into the structures, the intrinsic vacancy is referred as

- Anionic vacancy
- Schottky defect
- Cationic vacancy
- Frenkel defect

**Question No.2**

What is the resolving power of a Transmission Electron Microscope?

- 0.05 nm
- 0.2 nm
- 0.1 nm
- 0.02 nm

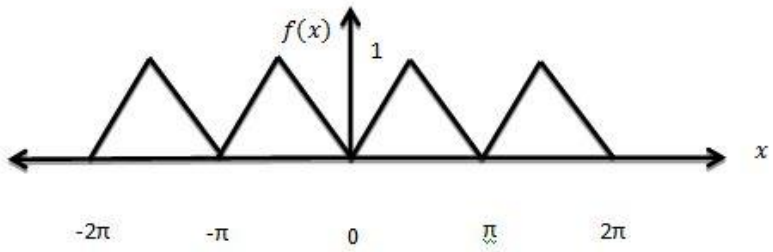
**Question No.3**

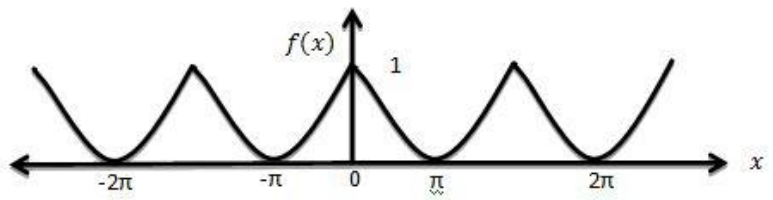
Five membered hetro cyclic compounds are

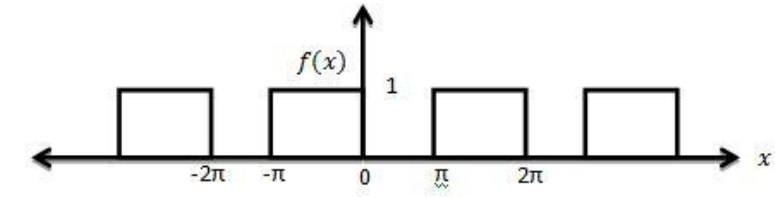
- Furan, Pyrrole and Thiophene
- Imidazole, oxazole and Purine
- Furan, quinoline and purine
- Pyridazine, pyrimidine and pyrazine

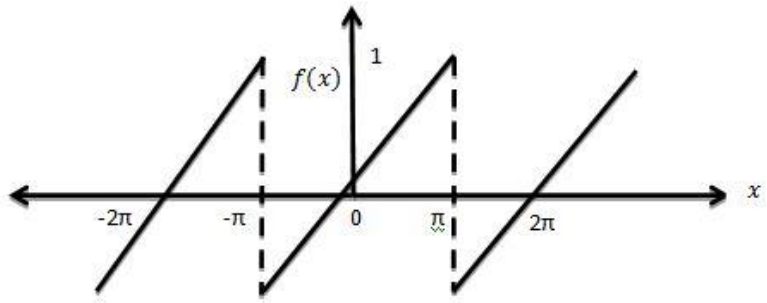
**Question No.4**

$f(x) = \begin{cases} 1, -\pi < x < 0 \\ 0, \ 0 < x < \pi \end{cases}$ , In this case the sketch is






**Question No.5**

The wave function for a particle is

$$\psi = \sqrt{\frac{1}{6}}\psi_1 + \frac{i}{\sqrt{3}}\psi_2 + \frac{1}{\sqrt{2}}\psi_3$$

Where $\psi_1, \psi_2$ and $\psi_3$ are the energy eigenfunction having energies $E_1$, $E_2$ and $E_3$ respectively, then average energy is given by

- $\frac{1}{6}E_1 + \frac{1}{3}E_2 + \frac{1}{2}E_3$
- None of these
- $\sqrt{\frac{1}{6}}E_1 + \frac{1}{3}E_2 + \sqrt{\frac{1}{2}}E_3$
- $\sqrt{\frac{1}{6}}E_1 + i\sqrt{\frac{1}{3}}E_2 + \sqrt{\frac{1}{2}}E_3$

**Question No.6**

_____ is based on our experience that energy can neither created nor destroyed, if both the system and the surrounding are taken into account.

- Zeroth law of Thermodynamics
- Third law of Thermodynamics
- First law of Thermodynamics
- Second law of Thermodynamics

**Question No.7**

Yoghurt is a food product produced by employing

- Biotechnology
- Tissue culture
- Hybridization
- Protoplast fusion

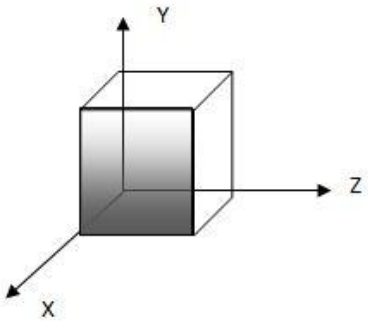
**Question No.8**

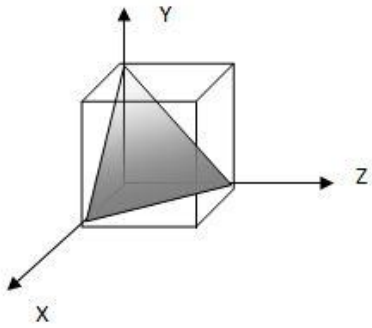
Arrhenius plots frequently fail to show evidence of curvature because

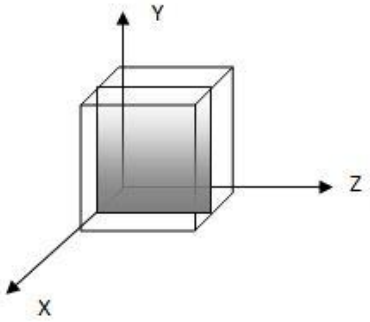
- The temperature dependence of the pre-exponential factor is higher than all the other factors.
- The temperature dependence of the exponent is equal to the temperature dependence of the pre-exponential factor.
- The temperature dependence of the exponent is much weaker than the temperature dependence of the pre-exponential factor.
- The temperature dependence of the exponent is much stronger than the temperature dependence of the pre-exponential factor.

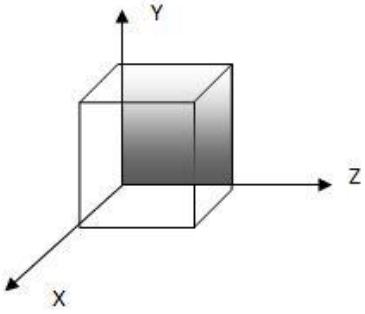
**Question No.9**

Find the (100) plane in a cubic crystal




**Question No.10**

What value of the activation energy is predicted by the Arrhenius equation if $T \rightarrow \infty$ ?

- $E_a = 1$
- $E_a = -1$
- $E_a = 0$
- $E_a = \infty$

**Question No.11**

Fine grain sizes are obtained by
(i) Slow cooling
(ii) Increasing nucleation rate
(iii) Decreasing growth rate
(iv) Fast cooling
Select the correct answer using the code given below

- (ii), (iii), (iv)
- (i), (ii), (iii)
- (i), (iii), (iv)
- (i), (ii), (iv)

**Question No.12**

_____is the practically non-corrosive.

- Kanthal
- Nichrome
- Chromel
- Inconel

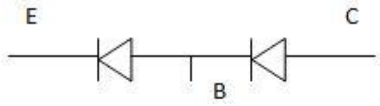
**Question No.13**

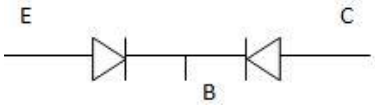
Which of the following is an analytic function of z everywhere in the complex plane?

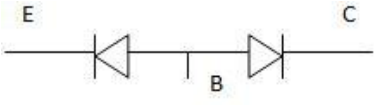
- $(Z^*)^2$
- $Z^2$
- $\sqrt{Z}$
- $|Z|^2$

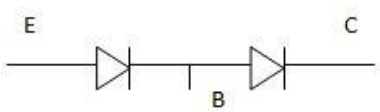
**Question No.14**

n-p-n transistor can be considered to be equivalent to two diodes as shown in figure.

- 

- 

- 

- 


**Question No.15**

Quantization of the spins of $^1H$ (I =1/2) magnetic nuclei in an external magnetic field is

- $m_I = 1, \frac{1}{2}$
- $m_I = \frac{1}{2}, 0, -\frac{1}{2}$
- $m_I = \frac{1}{2}, -\frac{1}{2}$

- $m_I = 1, 0, -1$

**Question No.16**

Mendel's experimental material was

- Pisum sativum
- Oryza sativa
- Mirabilis jalappa
- Lathyrus Odaratus

**Question No.17**

Heat is transferred to a heat engine from a furnace at a rate of 90 MW. If the rate of waste heat rejection to a nearby river is 40 MW, the thermal efficiency of this heat engine is

- 42.50%
- 45.50%
- 55.50%
- 52.50%

**Question No.18**

The decomposition of $N_2O_5$ proceeds as $2N_2O_5 \rightarrow 4NO_2 + O_2$ and the rate law is expressed as

$\frac{d[N_2O_5]}{dt} = k_1[N_2O_5]$. What is the order of reaction?

- Third order rate equation
- First order rate equation
- Second order rate equation
- Zero order rate equation

**Question No.19**

Find the correct option
(A) Statement : H2S and NH3 can't act as terminal electron acceptors in anaerobic respiration
(B) Reason : Both already completely reduced

- Both (A) and (B) are true
- (A) false and (B) true
- Both (A) and (B) are false
- (A) true and (B) false

**Question No.20**

Frequency of the radiation needed to flip the nucleus in NMR is formulated as _____

- $\nu = \frac{\lambda}{2\pi}$
- $\nu = \frac{\lambda H_o}{2\pi}$
- $\nu = \frac{\lambda H_o}{4\pi}$
- $\nu = \frac{\lambda}{4\pi}$

**Question No.21**

Kelvin – Planck statement of the second law of thermodynamics is expressed as _____

- It is impossible to construct a device that operates in a cycle and produces various effect to the transfer of heat from a higher temperature body to lower temperature body.
- It is impossible for any device that operates on a cycle to receive heat from multiple reservoirs and produce a net amount of work.
- It is impossible to construct a device that operates in a cycle and produces no effect other than the transfer of heat from a lower temperature body to higher temperature body.
- It is impossible for any device that operates on a cycle to receive heat from single reservoir and produce a net amount of work.

**Question No.22**

The interplanar spacing of the first reflecting plane (lowest θ) in an FCC crystal

- $a$
- $\sqrt[a]{3}$
- $a/\sqrt{3}$
- $a/\sqrt{2}$

**Question No.23**

Hormones are relatively long lived signals that travel throughout the body. This type of signaling is called _____

- Endocrine signaling
- Paracrine signaling
- Synaptic signaling
- Autocrine signaling

**Question No.24**

Uncertainity relation cannot hold for the following pairs

- Energy and time
- Angular momentum and angle
- Position and momentum
- Linear momentum and angle

**Question No.25**

The actual rate equation for the reaction $CH_3COCH_3 + I_2 \rightarrow CH_3COCH_2I + HI$ is $\frac{d[CH_3COCH_3]}{dt} = k[CH_3COCH_3][H^+]$. What is the order of the reaction with respect to acetone.

- First order rate equation
- Second order rate equation
- Zero order rate equation
- Third order rate equation

**Question No.26**

The Fourier series for the function $f(x)$ in the interval $\alpha < \alpha + 2\pi$ is given by

- $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \frac{n\pi x}{l} + \sum_{n=1}^{\infty} b_n \frac{n\pi x}{l}$
- $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \frac{n\pi x}{l} + \sum_{n=1}^{\infty} b_n \frac{n\pi x}{l}$
- $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$
- $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos nx + \sum_{n=1}^{\infty} b_n \sin nx$

**Question No.27**

bb mates with Bb. What will be characteristic of offspring?

- 75% recessive
- All dominant
- 50% recessive
- 25% recessive

**Question No.28**

When the quantum number l=3, the quantum number ml takes the following number of values

- 6
- 14
- 7
- 10

**Question No.29**

_____ effect can arise if delocalization of the unpaired electron in the reactant and product radical is possible.

- Steric
- Stabilization
- Polar
- Thermodynamic

**Question No.30**

First cloned animal

- Dog
- Dolly Sheep
- Cat
- Mule

**Question No.31**

Find the Probability of throwing sum 9 with two dice

- $\frac{1}{9}$
- $\frac{1}{18}$
- $\frac{1}{36}$
- $\frac{1}{27}$

**Question No.32**

Soft iron is used to manufacture electromagnets because their

- Retentivity is high
- Area of hysteresis curve is high
- Magnetic saturation limit is high and retentivity and coercive force are small
- Coercive force is high

**Question No.33**

Energies of a particle in a box are given by

- $\frac{1}{2}(\frac{h\omega}{2\pi})$
- $\frac{n^2\pi^2h^2}{8\pi ml^2}$
- $n+\frac{1}{2}(\frac{h\omega}{2\pi})$
- $\frac{\pi(\frac{h}{2\pi})}{2ml^2n^2}$

**Question No.34**

The commutator$[x.p^2]$, where $x$ and $p$ are position and momentum operators respectively, is

- $2i\hbar xp$
- $2i\hbar p$
- $-i\hbar p$
- $-2i\hbar xp$

**Question No.35**

The difference between the magnitudes of the magnetic fields at which free nuclei and molecular nuclei resonate is called _____

- Multiple splitting
- Isomer shift
- Chemical shift
- Hyperfine splitting

**Question No.36**

Let A=i+2j-k , B=2i+j-3k, C=3i-2j+k Find the value of Product (A X B).C

- 15
- -20
- 20
- -10

**Question No.37**

Find the characteristic Equation of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

- $\lambda^3 - 7\lambda^2 + 36 = 0$
- $\lambda^3 - 7\lambda^2 + 2\lambda + 36 = 0$
- $\lambda^3 + 7\lambda^2 + 2\lambda + 38 = 0$
- $\lambda^3 + 7\lambda^2 + 38 = 0$

**Question No.38**

Which is the correct ordering of the band gaps energy?

- Quartz < germanium > silver
- Quartz > germanium > silver
- Quartz > germanium < silver
- Quartz < germanium < silver

**Question No.39**

Select the correct pairs
(i) Adenine: Thymine :: Guanine:Cytosine
(ii) Adenine: Cytosine :: Guanine: Thymine
(iii) Thymine: Cytosine:: Adenine: Guanine

- (ii) & (iii)
- (iii) only
- (i) & (ii)
- (i) only

**Question No.40**

A vector perpendicular to any vector that lies on the plane defined by x+y+z=6

- $2\hat{\imath} + 3\hat{\jmath} + 6\hat{k}$
- $\hat{\imath} + \hat{\jmath} + \hat{k}$
- $\hat{\imath} + \hat{\jmath} - \hat{k}$
- $\hat{\jmath} + \hat{k}$

**Question No.41**

Growth hormone is produced by _____

- Pituitary gland
- Thyroid gland
- Adrenal gland
- Bones

**Question No.42**

Match the correct options

| | | | |
|---|---|---|---|
| (i) | paint | - | cellulose derivatives |
| (ii) | varnishes | - | mixture of both paint and varnish |
| (iii) | enamel | - | mixture of vehicle and pigment |
| (iv) | lacquer | - | colloidal dispersion and contain no pigments |

Select the correct answer using the code given below.

- ii, iii, iv & i
- iv, iii, ii &i
- ii, iii, i &iv
- iv, iii, i & ii

**Question No.43**

Which of the following is the correct statement

(i) Hermitian operators have real eigen values

(ii) Orthonormal functions satisfy the condition $\int \Psi_m^*(x)\Psi_n(x)dx = \delta_{mn}$

(iii) Linear momentum $P = \frac{ih}{2\pi}(\frac{\partial}{\partial t})$

(iv) $E_n = (2n+1)\frac{h\omega}{2\pi}$

- (i), (ii) & (iii)
- (i) & (ii)
- (i), (ii) & (iv)
- (ii) & (iv)

**Question No.44**

Pauli's exclusion principle applies to

- Maxwell-Boltzmann Statistics
- Bose-Einstein Statistics
- Fermi-Dirac Statistics
- Quantum Statistics

**Question No.45**

Find the Transpose of a matrix $X = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$.

- $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
-

$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 0 & 1 \\ 1 & 0 & 1 \end{bmatrix}$

**Question No.46**

Two dice are thrown, the probability that the same number will appear on each of them is

$\frac{1}{6}$

$\frac{1}{36}$

$\frac{1}{9}$

$\frac{1}{18}$

**Question No.47**

Which of the following statements are correct?
Shape memory behavior of nitinol wire exhibits due to
(i) Diffusion less transformation
(ii) Civilian transformation
(iii) Detwinned Martensite
(iv) Pseudoelastic Effect

(ii) & (iii)

(i), (iii) & (iv)

(i) & (iv)

(i), (ii) & (iii)

**Question No.48**

Which of the function is analytic?

$f(Z) = I_m(Z)$

$f(Z) = R(iZ)$

$f(Z) = \sin Z$

$f(Z) = \bar{Z}$

**Question No.49**

de-Broglie wavelength for charged particle of charge q and accelerated through a potential difference of V volts expressed as

$\frac{h}{2mqv}$

$\frac{h}{\sqrt{2E_k qV}}$

$\frac{h}{\sqrt{2mqv}}$

$$\frac{h}{2E_k qV}$$

**Question No.50**

Appearance of thiophene is _____

- Red colour liquid
- Colourless liquid
- Red colour solid
- Colourless soild

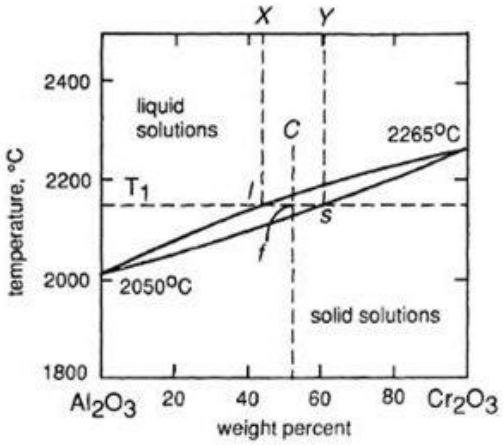
**Question No.51**

If $\bar{\nabla}u = 2r^4\vec{r}$, find $u$

- $2r^4$
- $\frac{1}{3}r^6 + Constant$
- $8r^3$
- $\frac{1}{6}r^6 + Constant$

**Question No.52**

Using the figure given below find the liquid composition of $Cr_2O_3$ and $Al_2O_3$




- 50 % $Cr_2O_3$ and 50 % $Al_2O_3$
- 57 % $Cr_2O_3$ and 42 % $Al_2O_3$
- 42 % $Cr_2O_3$ and 58 % $Al_2O_3$
- 60 % $Cr_2O_3$ and 40 % $Al_2O_3$

**Question No.53**

If $|f(Z)|$ is constant, then $f(Z)$ is

- Variable
- Partially variable and constant
- Constant
- None of these

**Question No.54**

Which of the following features is common in prokaryotes and eukaryotes

- A cell wall made of cellulose
- Flagella or cilia that contain microtubules
- A membrane-bounded nucleus
- Ribosomes

**Question No.55**

Peptide bond is a

- Hydrogen bond
- Ionic bond
- Metallic bond
- Covalent bond

**Question No.56**

Match the following options

| | | |
|---|---|---|
| (i) Prokaryotic | - | Weapons(or) keys to destroy a cell |
| (ii) Antigens | - | Lack nucleus |
| (iii) Antibodies | - | Power house of the cell |
| (iv) Mitochondria | - | Locks (or) security gates in a cells |

Select the correct answer using the code given below.

- (ii), (i), (iv) & (iii)
- (iii), (i), (ii) & (iv)
- (i), (ii), (iii) & (iv)
- (iii), (i), (iv) & (ii)

**Question No.57**

Consider a function $f(Z) = \frac{Z \sin Z}{(Z-2\pi)^2}$ of a complex variable Z. which of the following statement is true for the function $f(Z)$?

- f(Z) has a simple pole at Z = 2π
- f(Z) has a pole of order 2 at Z = 2π
- f(Z) has a Zero at Z = π
- f(Z) is analytic everywhere in the complex plane

**Question No.58**

If $\vec{r}$ is position vector, then curl $\vec{r}$ is

- 3
- 0
- $r^{3/2}$
- $r^{-2}\, r$

**Question No.59**

The Newton-Raphson formula is

- $x_{n+1} = x_n - \frac{f(x_n)}{f^1(x_n)}$
- $x_{n+1} = x_n + \frac{f(x_n)}{f^1(x_n)}$
- $x_{n+1} = x_n - \frac{f^1(x_n)}{f(x_n)}$
- $x_{n+1} = x_n + \frac{f^1(x_n)}{f(x_n)}$

**Question No.60**

Frenkel-defect in ceramic material is

- Vacancy- interstitial pair of cations
- Interstitial impurity
- Pair of nearby cation and anion vacancies
- Substitutional impurity

**Question No.61**

Heritable changes in the genetic material give rise to alternative forms of any gene called as

- Aberration
- Carcinogen
- Mutation
- Oncogen

**Question No.62**

Blue eye colour is recessive to brown eye colour. A brown eyed man whose one parent has recessive set of allele, marries a blue-eyed woman. The children will be

- Blue eyed and brown eyed 3:1
- All brown eyed
- Both blue eyed and brown eyed 1:1
- All blue eyed

**Question No.63**

The most abundant immunoglobulin is

- IgM
- IgG
- IgE
- IgA

**Question No.64**

Magnetic Susceptibility χ is given by the following relation

- $\chi = \frac{I}{H}$
- $\chi = \frac{B}{H}$
- $\chi = \frac{H}{I}$
- $\chi = \frac{H}{B}$

**Question No.65**

Lipids are soluble in

- Water
- Chloroform
- Carbon tetrachloride ($CCl_4$)
- Methyl chloride ($CH_2Cl_2$)

**Question No.66**

Quantization of the spins of $^{14}N$ (I = 1) magnetic nuclei in an external magnetic field is

- $m_I = 1, \frac{1}{2}$
- $m_I = \frac{1}{2}, -\frac{1}{2}$
- $m_I = \frac{1}{2}, 0, -\frac{1}{2}$
- $m_I = 1, 0, -1$

**Question No.67**

How do RNA molecules structurally differ from DNA molecules?

- Contains uracil rather than thymine
- Ribose rather than deoxyribose
- Single stranded
- All of these

**Question No.68**

What is the value of the following series?

$$\left(1-\frac{1}{2!}+\frac{1}{4!}-\cdots\right)^2+\left(1-\frac{1}{3!}+\frac{1}{5!}-\cdots\right)^2$$

- 0
- 1
- $e^2$
- e

**Question No.69**

Poisson's distribution is

- $P(r) = \frac{m^r e^{-m}}{r!}$
- $P(r) = \frac{m^r e^m}{r+1!}$
- $P(r) = \frac{m^r e^m}{r!}$
- $P(r) = \frac{m^r e^{-m}}{r+1!}$

**Question No.70**

The eigen values of matrix $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ are

- 1,2
- 0,2
- 1,1
- 1,0

**Question No.71**

The diffusion current is proportional to

- Square of the applied electric field
- Applied electric field
- Concentration gradient of the charge carries
- Discrete charge distribution

**Question No.72**

Spins of Fermions is equal to

- Positive integer
- Any fraction
- Positive integral multiple of 1/2
- Integer

**Question No.73**

The eigen functions of hydrogen atom contain which of the following?
(i) Legendre Polynomials
(ii) Laguerre Polynomials
(iii) Hermite Polynomials

- i only
- ii only
- i and ii
- i, ii and iii

**Question No.74**

The electric field inside a spherical shell of uniform surface charge density is

- Non-Zero Constant
- Inversely proportional to distance from centre
- Zero
- Directly proportional to distance from centre

**Question No.75**

The electrical conductivity of a semiconductor increases when electromagnetic radiation of wavelength shorter than 2480 nm is incident on it. The band-gap for the semiconductor approximately is (Planck's Constant = $6.64 \times 10^{-34}$ J.S )

- 0.7 eV
- 0.3 eV
- 0.5 eV
- 0.9 eV

**Question No.76**

Streptomycin used in the treatment of

- Malaria
- Tuberculosis
- Blood poisoning
- Yellow fever

**Question No.77**

_____ is defined as the one in which the activity of each constituent is equal to its mole fraction under all conditions of temperature, pressure and concentration.

- Ideal solutions
- Non-ideal gas mixture
- Non-ideal solutions
- Ideal gas mixture

**Question No.78**

Find the Sum and Product of the Eigen values of matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

- 6,-5
- 6,5
- 4,-5
- -5,4

**Question No.79**

What happens to the Fermi energy level when P-type and N-type semiconductors are joined together to form a PN junction

- Fermi energy level remains constant
- Fermi energy level decreases for N-type while increases for P-type until equilibrium is obtained
- Fermi energy level increases for N-type while decreases for P-type until equilibrium is obtained
- Fermi energy level remains unchanged and equilibrium is obtained

**Question No.80**

Runge-kutta formula for solving differential equation is

- $y = y_o + \frac{1}{6}[k_1 - 2k_2 + 2k_3 + k_4]$
- $y = y_o + \frac{1}{4}[k_1 + 2k_2 + 2k_3 + k_4]$
- $y = y_o + \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$
- $y = y_o + \frac{1}{5}[k_1 + 2k_2 + 2k_3 + k_4]$

**Question No.81**

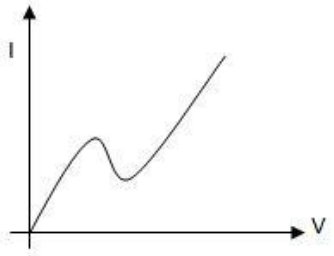
In a cylindrical crystal of radius r = 10 mm, calculate the ratio of cross-sectional area available for diffusion through the surface layers to the area available for mass transport through the cylinder. (Assuming the effective thickness of the surface to be 4 Å)

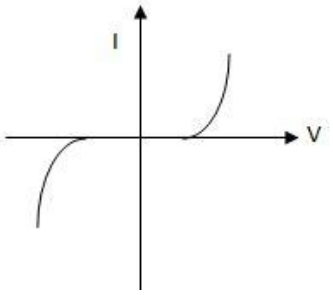
- 3.14
- $8 \times 10^{-8}$
- $2.51 \times 10^{-5}$

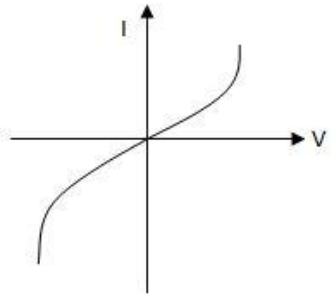
- $7.8814 \times 10^{-5}$

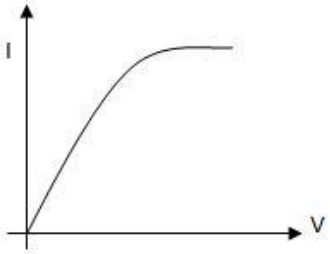
**Question No.82**

Find the I-V characteristics of Silicon diode




**Question No.83**

Which of the following is not a part of Maxwell's equation

- $\nabla . \mathcal{E} = 0$
- $\nabla . B = 0$
- $\nabla X \mathrm{H} = j + \frac{\partial D}{\partial t}$
- $\nabla X \mathcal{E} = -\frac{\partial B}{\partial t}$

**Question No.84**

The quantity of work in thermodynamics can be calculated from _____

- The change in kinetic energy of the mass ($E_{Kinetic}$

- The change in electrical energy of the mass ($E_{electrical}$ = mgh)
- The change in heat energy of the mass ($E_{Heat}$ = mgh)
- The change in potential energy of the mass ($E_{Potential}$ = mgh)

**Question No.85**

Importance of Kreb's cycle is

- Production of ATP molecules through oxidative phosphoxylation
- To encourage glycolysis
- Production of amino acids
- Production of vitamins

**Question No.86**

The first three reflecting planes of silicon (Diamond Cubic) are

- 110, 200, 211
- 111, 220, 311
- 100, 110, 111
- 111, 200, 220

**Question No.87**

Find the Eigen values of the matrix $B = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$

- 1,5
- -6,1
- -5,1
- 6,1

**Question No.88**

Which of the following statements are correct
Human body gets energy with the help of
(i) Aerobic respiration
(ii) Anaerobic respiration
(iii) Polysaccharides
(iv) glucose

- (ii) & (iv)
- (i) & (iv)
- (ii) & (iii)
- (i) & (ii)

**Question No.89**

What is the curve made up of the points in the (x,y) plane satisfying the equation |z|=3?

- Parabola
- Circle
- Line
- Hyperbola

**Question No.90**

In UV-visible spectroscopy, if a spectrum is expressed as absorbance (A) as a function of wavelength (λ), the Second order derivative spectra is _____

- $\frac{d^2A}{d\lambda} = f''(\lambda)$
- $\frac{dA}{d\lambda} = f''(\lambda)$
- $dA = f''(\lambda)$
- $\frac{d^2A}{d\lambda^2} = f''(\lambda)$

**Question No.91**

Condition to produce and maintain stimulated emission continuously in semiconductor laser is

- High current density in the order of 20 kA cm-$^2$ is applied
- More number of electrons are injected into the n-region
- More number of holes are injected into the p-region
- All of these

**Question No.92**

Translocations takes place when

- Breakage of the chromosomes occurs and the segment rotates 180˚
- More copies of a chromosomal segment are present
- Chromosomal segment are lost
- Non-homologous chromosomes break and exchange segments

**Question No.93**

Pure silicon at zero Kelvin (0K) is an

- Extrinsic semiconductor
- Metal
- Insulator
- Intrinsic semiconductor

**Question No.94**

RNA molecule differs from DNA molecule. Since RNA molecules contains uracil in the place of

- Cytosine
- Adenine
- Thymine
- Guanine

**Question No.95**

Copper has thermal conductivity _____ times greater at -269$^o$C than at 20$^o$C

- 28
- 35
- 46
- 19

**Question No.96**

Mechanical grinding is an example of _____ method

- top-down
- both
- Etching
- bottom-up

**Question No.97**

The magnitude of the critical cooling rate depends on the stability of the_____

- martensite
- detwinning
- austenite
- twinning

**Question No.98**

The Eigen values of matrix $\begin{bmatrix} 1 & i \\ -i & 1 \end{bmatrix}$ are

- 0 and -1
- 0 and +2
- +1 and +1
- -1 and +1

**Question No.99**

If $u = x^2 + y^2$, then $\frac{\partial^2 y}{\partial x \partial y}$ is equal to

- 2x+2y
- 0
- 2
- 2y

**Question No.100**

Arrange the following
Consecutive phases of mitosis are
(i) Metaphase
(ii) Anaphase
(iii) Prophase
(iv) Telophase

- (iv), (iii), (i) & (ii)
- (iii), (i), (ii) & (iv)
- (i), (ii), (iii) & (iv)
- (ii), (i), (iv) & (iii)