| Examination: **Ph.D. Green Energy Technology** |
| --- |

## Section 1 - Section 1

### Question No.1     4.00

A one-dimensional crystal of lattice dimension 'a' is metallic. If the structure is distorted in such a way that the lattice dimension is enhanced to '2a'

- ○ The width of conduction band increases
- ○ The width of the conduction band remains unchanged
- ○ The electronic structure remains unchanged
- ○ The width of conduction band decreases and a band gap is generated

### Question No.2     4.00

Study the following information carefully and answer the question below it

The Director of an MBA college has decided that six guest lectures on the topics of Motivation, Decision Making, Quality Circle, Assessment Centre, Leadership and Group Discussion are to be organised on each day from Monday to Sunday.
(i) One day there will be no lecture (Saturday is not that day), just before that day Group Discussion will be organised.
(ii) Motivation should be organised immediately after Assessment Centre.
(iii) Quality Circle should be organised on Wednesday and should not be followed by Group Discussion
(iv) Decision Making should be organised on Friday and there should be a gap of two days between Leadership and Group Discussion

Which of the pairs of lectures were organised on first and last day?

- ○ Quality Circle and Motivation
- ○ Group Discussion and Quality Circle
- ○ Group Discussion and Decision Making
- ○ None of these

### Question No.3     4.00

As a country, the United States is _____ that there are five time zones.

- ○ too big
- ○ very big
- ○ much big
- ○ so big

### Question No.4     4.00

Based on the information given, answer the below question.
1. A,B,C,D,E and F are travelling in a bus.
2. There are two reporters, two mechanics, one photographer and one writer in the group.
3. Photographer A is married to D who is a reporter.
4. The writer is married to B who is of the same profession as that of F.
5. A,B,C,D are two married couples and no one in this belong to the same profession.
6. F is the brother of C.

Which of the following is the pair of reporters?

- ○ DF
- ○ DE
- ○ Cannot be determined
- ○ AE

### Question No.5     4.00

Silicates with continuous 3D frame work are

○ Neso-Silicates

○ Soro-Silicates

○ Tecto-Silicates

○ Phyllo-Silicates

## Question No.6                                         4.00
Bookmark □

For a simple cubic crystal, X-ray diffraction shows intense reflections for angles and which are assigned to [1 0 1] and [1 1 1] planes, respectively. The ratio $\sin \theta_1 / \sin \theta_2$ is

○ 1.22

○ 1.5

○ 0.67

○ 0.82

## Question No.7                                         4.00
Bookmark □

If the sheet of a bakelite is inserted between the plates of an air capacitor, the capacitance will

○ Increase

○ Zero

○ Decrease

○ Remains unchanged

## Question No.8                                         4.00
Bookmark □

Let $\vec{F}$ be a vector field and $\phi$ be a scalar field. Then which of the following is *not* meaningful?

○ $(\nabla \times \vec{F}) \cdot (\nabla \phi)$

○ $\vec{F} \cdot \nabla \phi$

○ $\phi \vec{F}$

○ $\nabla \times (\nabla \cdot \vec{F})$

## Question No.9                                         4.00
Bookmark □

Choose the best synonym of the italicized word.
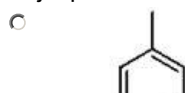Reena has an *insatiable* love for music.

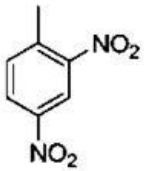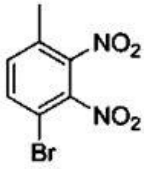○ unquenchable

○ undesirable

○ unchanging

○ irreconcilable

## Question No.10                                        4.00
Bookmark □

The major product formed in the dinitration of 4-bromotoluene is

○

O$_2$N   NO$_2$

Br

○

NO$_2$

NO$_2$

Br

○

NO$_2$

NO$_2$

○

NO$_2$

O$_2$N   Br

---

IPM stands for

○ Integrated Plant Management

○ Invasive Pest Management

○ Integrated Pest Monitoring

○ Integrated Pest Management

---

Identify the adverb in the following sentence:
We looked upwards and saw a bright shooting star

○ looked

○ upwards

○ bright

○ shooting

**Question No.13**     4.00

The differential equation

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$$

○ has only one solution

○ has only two linearly independent solutions

○ has only three linearly independent solutions

○ has only two solutions

**Question No.14**     4.00

Anand is heavier than Gopal.Mohan is lighter than Jagan.Pandian is heavier than Jagan but lighter than Gopal. Who is the heaviest of all ?

○ Gopal

○ Anand

○ Pandian

○ Jagan

**Question No.15**     4.00

The COP of a heat pump working on a reversed Carnot cycle is

○ $(T_1-T_2) / T_1$

○ $(T_1-T_2) / T_2$

○ $T_2 / (T_1-T_2)$

○ $T_1 / (T_1 - T_2)$

**Question No.16**     4.00

The percentage of $CO_2$ in biomethane is

○ 45-55%

○ 25-30%

○ 32-43%

○ 15-20%

**Question No.17**     4.00

Polio vaccines used currently

○ is an animal derived virus

○ consists of only live attenuated virus

○ May be killed virus

○ May be either killed or attenuated

**Question No.18**     4.00

Solar constant is ……

○ 342 W/m$^2$

○ 1497 W/m$^2$

○ 1597 W/m$^2$

○ 1367 W/m$^2$

## Question No.19                                                4.00
**Bookmark** ☐

The maximum efficiency of full –wave rectifier

○ 18.2

○ 81.2

○ 64.6

○ 40.6

## Question No.20                                                4.00
**Bookmark** ☐

Which process improves the efficiency of solid waste management?

○ Composting

○ Disposal

○ Processing

○ Incineration

## Question No.21                                                4.00
**Bookmark** ☐

50% of the species in the total world is present in

○ coral reefs

○ tropical rain forest

○ deciduos forests

○ temperate rain forest

## Question No.22                                                4.00
**Bookmark** ☐

An ideal gas was subjected to a reversible adiabatic expansion and then its initial volume was restored by a reversible isothermal compression. If q denotes the heat added to the system and w the work done by the system, then

○ W<0, q>0

○ w>0, q>0

○ W<0<, q<0

○ w>0, q<0

## Question No.23                                                4.00
**Bookmark** ☐

Helminth infections are characterised by

○ High levels of IgE

○ Decresaed eosinophils

○ High levels of IgA

○ Increased activity of Th1 cells

## Question No.24                                                4.00
**Bookmark** ☐

The structures of $XeF_2$ and $XeO_2F_2$ respectively are

○ bent, tetrahedral

○ bent, see-saw

○ linear, see-saw

**Question No.25**                                                          4.00

**Bookmark** ☐

Which of the following matrices has a rank less than 3?

○ $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 3 & 3 & 5 \end{pmatrix}$

○ $\begin{pmatrix} 1 & 1 & 1 \\ 2 & 1 & 1 \\ 0 & 1 & 0 \end{pmatrix}$

○ $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 3 & 3 & 6 \end{pmatrix}$

○ $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 3 & 1 & 2 \end{pmatrix}$

**Question No.26**                                                          4.00

**Bookmark** ☐

The system of equations

$$x - 2y + 3z = \alpha$$
$$10x - 20y + 30z = \beta$$

○ Has only one solution if $\beta = 10\alpha$

○ Has infinitely many solutions if $\beta = 10\alpha$

○ Has no solution if $\beta = 10\alpha$

○ Has infinitely many solutions only if $\alpha = \beta = 0$.

## Question No.27
4.00

**Bookmark** ☐

When a bar is subjected to a change of temperature and its deformation is prevented, which of the following stresses are induced

○ Thermal Stress

○ Tensile Stress

○ Compressive Stress

○ Shear Stress

## Question No.28
4.00

**Bookmark** ☐

Due to _____, the subways were closed all morning.

○ floods

○ are flooded

○ its flooding

○ flood

## Question No.29
4.00

**Bookmark** ☐

In a step down transformer, the number of turns in the primary …………that in secondary

○ Lesser than

○ Has no effect

○ Greater than

○ Same

## Question No.30
4.00

**Bookmark** ☐

A carnot takes up 90 J of heat from the source kept at 300 K. The correct statement among the following is

○ It transfers 50 J of heat to the sink at 250 K

○ It transfers 60 J of heat to the sink at 200 K

○ It transfers 60 J of heat to the sink at 250 K

○ It transfers 50 J of heat to the sink at 200 K

## Question No.31
4.00

**Bookmark** ☐

In the mass spectrum of 1,2-dichloroethane, approximate ratio of peaks at m/z values 98, 100, 102 will be

○ 9:06:01

○ 1:02:01

○ 1:01:02

○ 3:01:01

## Question No.32
4.00

**Bookmark** ☐

In which of the following detector the pn-junction is used

○ Surface barrier detector

○ Scintillation counter

○ GM counter

○ Proportional counter

## Question No.33
4.00

**Bookmark** ☐

The condensation of a hydroxy acid produces a polyester with the probability of linkage at both ends being p. The mole fraction of k-mer chain formation is

$p^{k-1} (1-p)$

$p^{k-1}$

$p^k$

$p (1-p)^{k-1}$

---

**Question No.34**                                                    4.00

**Bookmark** ☐

X is twice as good a workman as Y and together they finish a piece of work in 18 days. In how many days will X alone finish the work?

○ 28

○ 27

○ 25

○ 26

---

**Question No.35**                                                    4.00

**Bookmark** ☐

Which of the following statements about cyclic photophosphorylation is correct?

○ Cyclic photophosphorylation utilizes excess ATP.

○ Cyclic photophosphorylation reduces NADP+ to NADPH

○ Cyclic photophosphorylation occurs in the cytochrome bf complex and utilizes electrons from photosystem I.

○ Cyclic photophosphorylation utilizes electrons from photosystem II.

---

**Question No.36**                                                    4.00

**Bookmark** ☐

Bristle : Brush

○ Stage: Chairs

○ Art: Sculpture

○ Arm : Leg

○ Key: Piano

---

**Question No.37**                                                    4.00

**Bookmark** ☐

The dissipation factor of a good dielectric is of the order of

○ 0.02

○ 0.2

○ 0.0002

○ 0.002

---

**Question No.38**                                                    4.00

**Bookmark** ☐

Mark-Houwink equation is used for the determination of

○ number-average molar mass

○ weight-average molar mass

○ viscosity-average molar mass

○ z-average molar mass

---

**Question No.39**                                                    4.00

**Bookmark** ☐

The structure obtained when all the tetrahedral holes are occupied in a fcc structure is of the type

○ NaCl

○ CaF2

○ CsCl

○ ZnS

## Question No.40
4.00

**Bookmark** ☐

A 6 pole, 3 phase induction motor running at 960 rpm is connected to 50 Hz supply. Its slip is
○ 2%
○ 8%
○ Zero
○ 4%

## Question No.41
4.00

**Bookmark** ☐

Fluorides in water can be removed by
○ Stagnation
○ Boiling
○ Reverse osmosis
○ Filtration

## Question No.42
4.00

**Bookmark** ☐

The heat sink is generally used with a transistor to……
○ Increase the forward current
○ Compensate for excessive doping
○ Decrease the forward current
○ Prevent excessive temperature rise

## Question No.43
4.00

**Bookmark** ☐

The scalar triple product of three vectors is 0 if
○ if they form the edges of a solid parallelepiped
○ if they are coplanar.
○ they are mutually perpendicular
○ any two of them are perpendicular

## Question No.44
4.00

**Bookmark** ☐

Kohlrausch's law is applicable to a dilute solution of
○ Potassium chloride in water
○ Hydrochloric acid in water
○ Benzoic acid in benzene
○ Acetic acid in water

## Question No.45
4.00

**Bookmark** ☐

The species having the strongest gas phase proton affinity among the following
○ $NF_3$
○ $NH_3$
○ $N(CH_3)_3$
○ $N^{3-}$

## Question No.46
4.00

Einstein's formula for heat capacity

○ Fails at all temperature range

○ Fails at higher temperature

○ Fails at lower temperature because it decreases exponentially instead of T³

○ Fails at lower temperature because it goes as T instead of T³

---

**Question No.47**     4.00

Let $\mathbf{C}$ be the portion of the parabola $y = x^2$ between $(0,0)$ and $(1,1)$ directed from the origin to $(1,1)$. For the scalar field $\phi = xy^2z^3$, the line integral $\oint_C \nabla\phi \cdot \vec{dr}$ is

○ $\pi$

○ $-\pi$

○ $\pi/2$

○ $0$

---

**Question No.48**     4.00

Which of the following uses Life Cycle Analysis attempts to offer alternatives to waste management

○ Incineration

○ Resource Recovery

○ Energy Recovery

○ Pyrolysis

---

**Question No.49**     4.00

The ratio of lateral strain to linear strain is known as

○ Elastic Limit

○ Poisson's ratio

○ Modulus of Elasticity

○ Modulus of Rigidity

---

**Question No.50**     4.00

**Assertion:** Crude oil is abundantly found in nature

**Reason:** It is the main raw material for all automobiles

○ A is false but R is true

○ Both A and R are true and R is the correct explanation of A

○ Both A and R are true and R is not the correct explanation of A

○ A is true but R is false

---

**Question No.51**     4.00

*In the following question, the first two words (given in italics) have a definite relationship. Choose one word out of*

*Truthfulness* is to *Liar* as *Loyalty* is to .........?.............
- ○ Traitor
- ○ Falsehood
- ○ Devotion
- ○ Worker

## Question No.52                                                                    4.00
**Bookmark** ☐

Oxidation of alcohol to acids involve formation and cleavage of bonds. Which of the following possibilities is valid in the process?

- ○ Formation of C=O bond and cleavage of O-H bond
- ○ Formation of C=O bond and cleavage of O-H and C=H bonds
- ○ Formation of C=O bond and cleavage of O-H and C-H bonds
- ○ Formation of C=O bond and cleavage of C-H bond

## Question No.53                                                                    4.00
**Bookmark** ☐

How many ATP molecules are required to fix one molecule of nitrogen
- ○ 12
- ○ 16
- ○ 20
- ○ 6

## Question No.54                                                                    4.00
**Bookmark** ☐

The most appropriate reagent suitable for the conversion of 2-octyne into trans-2-octene is
- ○ Zinc and acetic acid
- ○ 10 % Pd/C
- ○ Lithium in liquid ammonia
- ○ Hydrazine hydrate

## Question No.55                                                                    4.00
**Bookmark** ☐

The mother gripped her child's arm_____ he be trampled.
- ○ if
- ○ if not
- ○ unless
- ○ lest

## Question No.56                                                                    4.00
**Bookmark** ☐

Thermal radiations occur in the portion of electromagnetic spectrum between the wavelengths
- ○ $10^{-1}$ to $10^{2}$ micron
- ○ 0.1 to $10^{2}$ micron
- ○ $10^{-2}$ to $10^{-4}$ micron
- ○ $10^{-1}$ to $10^{-2}$ micron

## Question No.57                                                                    4.00
**Bookmark** ☐

For sphere, the critical thickness of insulation is given by
- ○ 2k / h
- ○ h / 2k
- ○ k / h

○ h / (2 p h)

## Question No.58
4.00

Horizontal axis and vertical axis are the types of
- ○ Wind mills
- ○ Solar cell
- ○ Nuclear reactor
- ○ Biogas reactor

## Question No.59
4.00

Let $O$ be the origin and $OA$ and $OB$ be two sides of the parallelogram $OABC$. Then we have

- ○ $\vec{OA} + \vec{OB} = \vec{OC}$
- ○ $\vec{OA} + \vec{OB} = \vec{OC}$
- ○ $\vec{OA} + \vec{OB} = \vec{OC}$
- ○ $\vec{OA} + \vec{OB} = \vec{OC}$

## Question No.60
4.00

Choose the best antonym of the italicized word.
The task assigned to him was *arduous.*
- ○ plain
- ○ absorbing
- ○ good
- ○ easy

## Question No.61
4.00

All-natural processes are irreversible. This is a direct consequence of
- ○ First law of thermodynamics
- ○ Third law of thermodynamics
- ○ Second law of thermodynamics
- ○ Gibb's paradox

## Question No.62
4.00

………..has a non-linear stress-strain curve
- ○ Low carbon steel
- ○ Copper
- ○ Rubber
- ○ Aluminium

## Question No.63
4.00

For $V_{GS} = 0V$, the drain current becomes constant when VDS exceeds
- ○ $V_P$
- ○ Cut off
- ○ 0V
- ○ $V_{DD}$

## Question No.64
4.00

**Bookmark** ☐

Study the following information carefully and answer the question below it:

Aasha, Bhuvnesh,Charan, Danesh, Ekta, Farhan, Ganesh and Himesh are sitting around a circle, facing the centre. Aasha sits fourth to the right of Himesh while second to the left of Farhan. Charan is not the neighbour of Farhan and Bhuvnesh. Danesh sits third to the right of Charan. Himesh never sits next to Ganesh.

Who is to the immediate left of Aasha?
- ○ Aasha
- ○ Bhuvnesh
- ○ Ganesh
- ○ Charan

---

**Question No.65**   4.00

**Bookmark** ☐

For an Op-amp with negative feedback, the output is …….
- ○ Equal to the input
- ○ Increased
- ○ Fed back to the non-inverting input
- ○ Fed back to the inverting input

---

**Question No.66**   4.00

**Bookmark** ☐

Ripple factor for half –wave rectifier
- ○ 2
- ○ 1.21
- ○ 0.48
- ○ 1

---

**Question No.67**   4.00

**Bookmark** ☐

In a throttling process
- ○ $h_1^2 = h_2$
- ○ $h_1 = h_2$
- ○ $h_1 = 2287 \times h_2$
- ○ $h_1 = 2h_2$

---

**Question No.68**   4.00

**Bookmark** ☐

If $\lambda_1$ is one of the eigenvalues of the matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$, then the other eigenvalue $\lambda_2$ is given by
- ○ $\lambda_2 = ad - bc - \lambda_1$
- ○ $\lambda_2 = \frac{ac - bd}{\lambda_1}$
- ○ $\lambda_2 = a + d - \lambda_1$

$$\lambda_2 = \frac{a+d}{\lambda_1}$$

**Question No.69**      4.00
**Bookmark** ☐

At 0 K, fluids are assumed to have
- Zero entropy
- Maximum entropy
- Minimum entropy
- Fixed value of entropy

**Question No.70**      4.00
**Bookmark** ☐

$A$, $B$, $C$ are $2 \times 2$ matrices such tha $AB = AC$. Which of the following is true?

- If $A$ is a matrix all of whose entries are not zero, then $B = C$
- $A$ is the zero matrix.
- $B = C$
- If $|A| \neq 0$, then $B = C$

**Question No.71**      4.00
**Bookmark** ☐

The common energy source in Indian villages is
- Coal
- Sun
- Electricity
- Wood and animal dung

**Question No.72**      4.00
**Bookmark** ☐

Choose the missing term: SHG, RIF, QJE, PKD, ?
- NMD
- OLC
- MLB
- OLD

**Question No.73**      4.00
**Bookmark** ☐

The Genetic code is unambiguous meaning that each triplet specifies
- Only single amino acid
- Many amino acids
- No amino acids
- Two amino acids

## Question No.74    4.00

**Bookmark ☐**

If Milk is water, water is sugar, sugar is road, road is sky and sky is track where do aeroplanes fly?

○ Sky

○ Sugar

○ Milk

○ Road

## Question No.75    4.00

**Bookmark ☐**

The area of the triangle whose vertices are given by $(0,0,0)$, $(1,2,-2)$, $(-1,1,1)$ is

○ $\sqrt{33}$

○ $\sqrt{14}$

○ $\frac{\sqrt{14}}{2}$

○ $\frac{\sqrt{3}}{2}$

## Question No.76    4.00

**Bookmark ☐**

The number of coordinates in the phase space of a single particle is

○ 2

○ 5

○ 6

○ 3

## Question No.77    4.00

**Bookmark ☐**

The function $f : [0, 3\pi] \longrightarrow \mathbb{R}$ defined as $f(x) = \sin x$ has

○ Its minimum value is $3\pi/2$.

○ Its minimum value is $0$

○ one maximum and two minima .

○ two maxima and one minimum

## Question No.78    4.00

**Bookmark ☐**

For an ideal gas at 300K

○ $\left(\frac{\partial U}{\partial T}\right)_V = 0$

○ $\left(\frac{\partial H}{\partial T}\right)_P = 0$

○ $\left(\dfrac{\partial G}{\partial T}\right)_P = 0$

○ $\left(\dfrac{\partial U}{\partial V}\right)_T = 0$

---

**Question No.79**                                                4.00
**Bookmark** ☐

Which of the following three vectors form the edges of a right angled triangle ?

○ $(-0.5, 0, 0)$, $(0.5, 0, 0)$ and $(0, \sqrt{3}/2, 0)$

○ $(2, -1, 1)$, $(3, 0, 2)$ and $(2, -1, 2)$

○ $(-2, 0, 0)$, $(2, 1, 0)$, $(0, 0, 0)$

○ $(1, 1, 1)$, $(2, 2, 2)$ and $(3, 3, 3)$

---

**Question No.80**                                                4.00
**Bookmark** ☐

For a thermodynamic system, Helmholtz free energy is a function of

○ S, V

○ T, p

○ S, p

○ V, T

---

**Question No.81**                                                4.00
**Bookmark** ☐


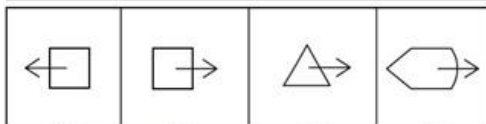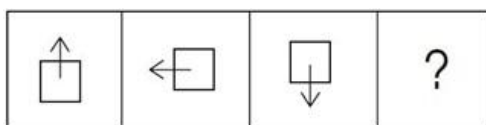
(A)        (B)        (C)        (D)

○ C

○ A

○ B

○ D

---

**Question No.82**                                                4.00
**Bookmark** ☐

In solar cell (pn junction) the photo generated charge carrier are separated by

○ Charge recombination

○ Fermi level in n-type region

○ Built in potential

## Question No.83                                                                                    4.00
**Bookmark** ☐

If the two strands of a DNA separated, the base sequence of each parental strand could serve as a template for the synthesis of new complementary strand, the process is called

○ Semi-conservative Replication

○ Multiplication

○ Generation

○ Duplication

## Question No.84                                                                                    4.00
**Bookmark** ☐

Conservation within the natural habitat is called

○ insitu conservation

○ in vivo conservation

○ ex vivo conservation

○ ex situ conservation

## Question No.85                                                                                    4.00
**Bookmark** ☐

Accuracy in the translation of mRNA into the primary structure of a polypeptide depends on specificity in the _____.

○ binding of ribosomes to mRNA

○ binding of the anticodon to small subunit of the ribosome

○ attachment of amino acids to rRNAs

○ binding of the anticodon to the codon and the attachment of amino acids to tRNAs

## Question No.86                                                                                    4.00
**Bookmark** ☐

Ocean temperature increase slower than that of land primarily because of the larger ------ of the oceans

○ Heat exchange

○ Heat capacity

○ Heat transfer

○ Heat balance

## Question No.87                                                                                    4.00
**Bookmark** ☐

The standard electrode potential $E^O$ at a fixed temperature and in a given medium is dependent on

○ the electrode composition and the extent of the reaction

○ the extent of the electrode reaction only

○ the electrode reaction and the electrode composition

○ only the electrode composition

## Question No.88                                                                                    4.00
**Bookmark** ☐

If $ABCD$ is a trapezium such that $AB \parallel CD$, then

○ $\vec{AD} = c\,\vec{BC}$ for some scalar $c$.

$\circ$ $\vec{AB} \times \vec{CD} = \vec{0}$

$\circ$ $\vec{AB} \cdot \vec{BC} = 0$

$\circ$ $\vec{AB} \cdot \vec{CD} = 0$

---

**Question No.89**                                                        4.00

Density of states for a one-dimensional Fermi system is proportional to

$\circ$ A constant

$\circ$ $\varepsilon$

$\circ$ $\varepsilon^{1/2}$

$\circ$ $\varepsilon^{-1/2}$

---

**Question No.90**                                                        4.00

Correct the error in the italicized part of the sentence by choosing the most appropriate option.
Whenever the two sisters *go out for shopping,* they take their pet dog with them.

$\circ$ go out to shopping

$\circ$ go out on shopping

$\circ$ go out shopping

$\circ$ go out of shopping

---

**Question No.91**                                                        4.00

The unit of Hall coefficient is

$\circ$ $Vm^2 A^{-1} Wb^{-1}$

$\circ$ $Vm^2 A^{-2} Wb$

$\circ$ $Vm^3 A^{-1} Wb^{-3}$

$\circ$ $Vm^3 A^{-1} Wb^{-1}$

---

**Question No.92**                                                        4.00

Evaluate the surface integral

$$\int\int_S (2 - x^2 - y^2 - z^2)dS$$

where $S$ is the upper hemisphere of radius unity and center $(0,0,0)$.

$\circ$ $\pi/2$

$\circ$ $(2/3)\pi$

$\circ$ $0$

$\circ$ $\pi$

---

**Question No.93**                                                        4.00

Approximately what proportion of the human genome is made up of repetitive DNA sequences?

$\circ$ 15%

$\circ$ 50%

$\circ$ 90%

$\circ$ 1%

## Question No.94
**4.00**

Bookmark ☐

If a certain Zener diode has a Zener voltage of 3.6 V, it operates in
- ○ Zener breakdown
- ○ Avalanche breakdown
- ○ Forward conduction
- ○ Regulated breakdown

## Question No.95
**4.00**

Bookmark ☐

Consider the function $f : [-1, 1] \longrightarrow I\!R$ defined as $f(x) = x^3$. Then
- ○ x = 0 is neither a maximum nor a minimum
- ○ x = 0 is a maximum.
- ○ x = 1 is a minimum
- ○ x = 0 is a minimum.

## Question No.96
**4.00**

Bookmark ☐

During transcription, the transcript is identical in sequence with one strand of the DNA called
- ○ Coding strand
- ○ Main strand
- ○ Coding molecule
- ○ Primary strand

## Question No.97
**4.00**

Bookmark ☐

These poultry belong to Mr. Kishen, our new neighbor
The underlined word is a _____noun.
- ○ abstract
- ○ collective
- ○ proper
- ○ common

## Question No.98
**4.00**

Bookmark ☐

Which of the following is not required for the expression of genes in the lactose operon?
- ○ Allolactose
- ○ Adenylate cyclase
- ○ lacI gene product
- ○ cAMP

## Question No.99

**Bookmark** ☐

The directional derivative of $\phi = xy - z^2$ at $(1, 1, 1)$ in the direction of $(-1, 2, 10)$ is given by

○ 0

○ 23

○ 1

○ -19

## Question No.100

4.00

**Bookmark** ☐

Study the following information carefully and answer the question below it

(i) There is a group of five persons- A, B, C, D and E
(ii) One of them is manual scavenger, one is sweeper, one is watchman, one is human scarecrow and one is grave-digger
(iii) Three of them – A, C and grave-digger prefer tea to coffee and two of them – B and the watchman prefer coffee to tea
(iv) The human scarecrow and D and A are friends to one another but two of these prefer coffee to tea.
(v) The manual scavenger is C's brother

Which of the above statements is unnecessary?

○ (ii)

○ Nill

○ (iv)

○ (iii)