

Section 1 - Section 1

Question No.1

4.00

Bookmark ☐

Based on the information given answer the following question.

1. In a family of six persons, there are people from three generations. Each has separate professions and they like different colours. There are two couples.
2. Shyam is an Engineer and his wife is not a doctor and she does not like Red colour.
3. Chartered Accountant likes green colour and his wife is a teacher.
4. Manisha is the mother-in-law of Sunita and she likes orange colour.
5. Vimal is the grand father of Tarun and tarun is the Principal and likes black colour.
6. Nyna is the grand daughter of Manisha and she likes blue colour. Nyna's Mother likes white colour.

What is the profession of Sunita?

- ☐ Cannot be determined
- ☐ Principal
- ☐ Teacher
- ☐ Chartered Accountant

Question No.2

4.00

Bookmark ☐

The utilization of elemental carbon by microorganisms during bio-geochemical cycles is termed as

- ☐ Dissimilation
- ☐ Immobilization
- ☐ Diffusion
- ☐ Mineralization

Question No.3

4.00

Bookmark ☐

Yeast Replicating plasmids (YRp) carry

- ☐ Centromere
- ☐ Telomere
- ☐ Mitochondrial DNA
- ☐ Autonomously replicating sequence

Question No.4

4.00

Bookmark ☐

A fully formed infectious virus particle is called as

- ☐ Prions
- ☐ Virusoid
- ☐ Virion
- ☐ Capsid

Question No.5

4.00

Bookmark ☐

Who is recognized as father of genetics?

- ☐ Louis Pasteur
- ☐ Gregor Mendel
- ☐ Darwin
- ☐ Alexander Fleming

Question No.6

4.00

Bookmark ☐

DNA makes and RNA makes proteins this is termed as

- ☐ metabolism
- ☐ biosynthesis
- ☐ Central dogma
- ☐ protein expression

Question No.7

4.00

Bookmark ☐

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

- ☐ $E_a = \infty$
- ☐ $E_a = 0$

☐ $E_a = -1$

☐ $E_a = 1$

Question No.8

4.00

Bookmark ☐

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

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

Question No.9

4.00

Bookmark ☐

The burgers vector of a dislocation in NaCl ($a = 5.58 \text{ \AA}$) is

- ☐ 5.58 \AA
- ☐ 4.83 \AA
- ☐ 3.95 \AA
- ☐ 2.79 \AA

Question No.10

4.00

Bookmark ☐

The basis for measuring thermodynamic property of temperature is given by

- ☐ first law thermodynamics
- ☐ Zeroth law thermodynamics
- ☐ third law thermodynamics
- ☐ second law thermodynamics

Question No.11

4.00

Bookmark ☐

A certain op-amp has bias currents of $50 \mu\text{A}$ and $49.3 \mu\text{A}$. The input offset current is

- ☐ $99 \mu\text{A}$
- ☐ $49.7 \mu\text{A}$
- ☐ $99.3 \mu\text{A}$
- ☐ 700 nA

Question No.12

4.00

Bookmark ☐

If A+B means A is daughter of B,
A-B means A is husband of B
A × B means A is brother of B

From the statement $A \times B \times C \times D$, which of the following statement is not necessarily true?

- ☐ C is the brother of A
- ☐ A, B, C are male
- ☐ B is the brother of A
- ☐ D is brother of C

Question No.13

4.00

Bookmark ☐

Let $A = i + 2j - k$, $B = 2i + j - 3k$, $C = 3i - 2j + k$

Find the value of Product $(A \times B) \cdot C$

- ☐ -20
- ☐ 15
- ☐ 20
- ☐ -10

Question No.14

4.00

Bookmark ☐

Correct the error in the italicized part of the sentence by choosing the most appropriate options
Job was a tiny man, barely five feet tall, with a *spright walk*

- ☐ a sprightly walk
- ☐ a sprightly walking
- ☐ spright walkingly
- ☐ spright walk

Question No.15

4.00

Bookmark ☐

Appearance of thiophene is _____

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

Question No.16

4.00

Bookmark ☐

The Laplace equation can be written as _____

- ☐ $\nabla^2 u = Constant$
- ☐ $\nabla^2 u = f(x)$
- ☐ $\nabla u = 0$
- ☐ $\nabla^2 u = 0$

Question No.17

4.00

Bookmark ☐

According to Debye's theory of specific heat at low temperature specific heat is proportional to

- ☐ T^2
- ☐ Independent of T
- ☐ T^3
- ☐ T

Question No.18

4.00

Bookmark ☐

Which among the following statement is wrong?

- ☐ Every thermodynamic system has its own equation of state independent of the others.
- ☐ An equation of state is a theoretical deduction from thermodynamics but is an experimental backing it.
- ☐ The equation of state is not applicable to systems which are not in thermodynamic equilibrium.
- ☐ An equation of state expresses the peculiar behaviour of one individual system which distinguishes it from the others

Question No.19

4.00

Bookmark ☐

For the cylindrical coordinate system, the coordinate r-curves are

- ☐ horizontal straight lines.
- ☐ horizontal circles with centres on the z-axis.
- ☐ vertical straight lines
- ☐ horizontal straight half-lines radiating from the z-axis.

Question No.20

4.00

Bookmark ☐

If A and B are non-zero square matrices, then $AB = 0$ implies

- ☐ A and B are singular
- ☐ A and B are orthogonal
- ☐ B is singular
- ☐ A is singular

Question No.21

4.00

Bookmark ☐

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

- ☐ 6,1
- ☐ 1,5
- ☐ -6,1
- ☐ -5,1

Question No.22

4.00

Bookmark ☐

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

- ☐ $\hat{j} + \hat{k}$
- ☐ $2\hat{i} + 3\hat{j} + 6\hat{k}$
- ☐ $\hat{i} + \hat{j} - \hat{k}$
- ☐ $\hat{i} + \hat{j} + \hat{k}$

Question No.23

4.00

Bookmark ☐

Symmetrical molecules are

- ☐ Biological molecules
- ☐ Polar
- ☐ Organic molecules
- ☐ Non- Polar

Question No.24

4.00

Bookmark ☐

Study the following information carefully and answer the question below it

Lakshman passes through seven lanes to reach his school. He finds that 'Truth lane' is between his house and 'Lie lane'. The third lane from his school is 'Karma lane'. 'Dharma lane' is immediately before the 'Yog lane'. He passes 'Salvation lane' at the end, 'Lie lane' is between 'Truth lane' and 'Dharma lane', the sixth lane from his house is 'Devotion lane'.

If Lakshman's house, each lane and his school are equidistant and he takes 2 minutes to pass one lane, then how long will he take to reach school from his house?

- ☐ 15 minutes
- ☐ 16 minutes
- ☐ 13 minutes
- ☐ 14 minutes

Question No.25

4.00

Bookmark ☐

Which of the following are electromagnetic in nature? 1) Alpha rays; 2) X – rays; 3) Gamma rays; 4) Cathode rays.

- ☐ 1 and 4
- ☐ 3 and 4
- ☐ 2 and 3
- ☐ 1 and 2

Question No.26

4.00

Bookmark ☐

A function u is said to be harmonic if and only if

- ☐ $u_x^2 + u_y^2 = 0$
- ☐ $u_{xy} + u_{yx} = 0$
- ☐ $u_x + u_y = 0$
- ☐ $u_{xx} + u_{yy} = 0$

Question No.27

4.00

Bookmark ☐

Genes are pieces of _____ that contain information for synthesis of ribonucleic acids (RNAs) or polypeptides

- ☐ Proteins
- ☐ pyrimidines
- ☐ Purines
- ☐ DNA

Question No.28

4.00

Bookmark ☐

Which one of the following cannot be polarized?

- ☐ Sound waves
- ☐ Radio waves
- ☐ Microwaves
- ☐ X-rays

Question No.29

4.00

Bookmark ☐

She studies very hard for the exams, _____?

- ☐ isn't it?
- ☐ is it?
- ☐ does she?
- ☐ doesn't she?

Question No.30

4.00

Bookmark ☐

The first step in gene expression is

- ☐ Translation
- ☐ Transcription
- ☐ Transduction
- ☐ Replication

Question No.31

4.00

Bookmark ☐

Crumb : Bread ::

- ☐ Flower : Vase
- ☐ Tea : Cup
- ☐ Splinter : Wood
- ☐ Water : Bucket

Question No.32

4.00

Bookmark ☐

Biochips are made up of

- ☐ conducting molecules inserted into the protein frame work
- ☐ semi-conducting molecules inserted into the protein frame work
- ☐ functionalization
- ☐ non-conducting molecules inserted into the protein frame work

Question No.33

4.00

Bookmark ☐

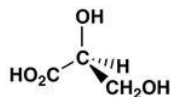
Study the following information carefully and answer the question below it

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.

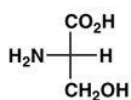
- (i) One day there will be no lecture (Saturday is not that day), just before that day Group Discussion will be organised.
- (ii) Motivation should be organised immediately after Assessment Centre.
- (iii) Quality Circle should be organised on Wednesday and should not be followed by Group Discussion
- (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 following information is not required for the above lecture arrangements?

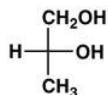
- ☐ Only (ii)



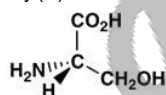
- ☐ All are required



- ☐ Only (i)



- ☐ Only (iii)



Question No.34

4.00

Bookmark ☐

Figure out the odd statement about ceramics in the following.

- ☐ Contains both metallic and non-metallic elements
- ☐ usually less dense than metals
- ☐ Ductile in nature
- ☐ Good insulators of heat and electricity

Question No.35

4.00

Bookmark ☐

The genetic information is stored in the form of _____ in most of the organisms.

- ☐ RNA
- ☐ DNA
- ☐ Proteins
- ☐ Histones

Question No.36

4.00

Bookmark ☐

If the energy of a quantum harmonic oscillator is $E_n = nh\nu$, $n = 1, 2, 3, \dots$, the partition function of the system of oscillators is

- ☐ $e^{-\frac{h\nu}{kT}}$
- ☐ $\frac{1}{e^{\frac{h\nu}{kT}} - 1}$
- ☐ $\frac{1}{1 - e^{\frac{h\nu}{kT}}}$
- ☐ $e^{\frac{h\nu}{kT}}$

Question No.37

4.00

Bookmark ☐

As per Faraday's laws of electromagnetic induction, an e.m.f. is induced in a conductor whenever it

- ☐ Lies perpendicular to the magnetic flux
- ☐ Moves parallel to the direction of the magnetic field
- ☐ Lies in a magnetic field
- ☐ Cuts magnetic flux

Question No.38

4.00

Bookmark ☐

When an ideal monatomic gas is expanded adiabatically from an initial volume V_0 to $3V_0$, its temperature changes from T_0 to T . Then the ratio T/T_0

- ☐ $(1/3)^{1/3}$
- ☐ 3
- ☐ $1/3$
- ☐ $(1/3)^{2/3}$

Question No.39

4.00

Bookmark ☐

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

Question No.40

4.00

Bookmark ☐

A dielectric material must be

- ☐ Semiconductor
- ☐ Insulator
- ☐ Good conductor
- ☐ Resistor

Question No.41

4.00

Bookmark ☐

What is the value of the following series?

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

- ☐ e
- ☐ 1
- ☐ 0
- ☐ e²

Question No.42

4.00

Bookmark ☐

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

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

Question No.43

4.00

Bookmark ☐The actual rate equation for the reaction $CH_3COCH_3 + I_2 \rightarrow CH_3COCH_2I + HI$ is

$$\frac{d[CH_3COCH_3]}{dt} = k[CH_3COCH_3][H^+]. \text{ What is the order of the reaction with respect to}$$

acetone.

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

Question No.44

4.00

Bookmark ☐Let $f(x,y) = e^{x^2} \cos y$. What is $\nabla f(x,y)$?

- ☐ $e^{x^2} \cos y i - e^{x^2} \sin y j$
- ☐ $2x e^{x^2} \cos y i - e^{x^2} \sin y j$

- ☐ $e^{x^2}i + \cos yj$
☐ $2xe^{x^2}\cos y - e^{x^2}\sin y$

Question No.45

4.00

Bookmark ☐

This is the school where I studied till class 5.
 The underlined word is a

- ☐ preposition
☐ adjective
☐ pronoun
☐ adverb

Question No.46

4.00

Bookmark ☐

What is the resolving power of a Transmission Electron Microscope?

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

Question No.47

4.00

Bookmark ☐

The eigen functions of hydrogen atom contain which of the following?

- (i) Legendre Polynomials
 (ii) Laguerre Polynomials
 (iii) Hermite Polynomials

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

Question No.48

4.00

Bookmark ☐

In thermodynamics a quantity of energy that flows across the boundary between the system and the surrounding that can be used to change the height of the mass in the surroundings is defined as _____

- ☐ Work
☐ Force
☐ Heat
☐ Mass

Question No.49

4.00

Bookmark ☐

A can finish a work in 18 days and B can do the same work in half the time taken by A. Then, working together, what part of the same work they can finish in a day?

- ☐ 0 1/8
☐ 0 1/4
☐ 0 1/2
☐ 0 1/6

Question No.50

4.00

Bookmark ☐

Final product in aerobic glycolysis is

- ☐ Lactic acid
- ☐ Glucose
- ☐ Pyruvate
- ☐ Lactate

Question No.51

4.00

Bookmark ☐

Microorganisms are in a rapidly growing and dividing state in

- ☐ Stationary phase
- ☐ Log phase
- ☐ Declining phase
- ☐ Lag phase

Question No.52

4.00

Bookmark ☐

Calculate the degrees of freedom in an aqueous solution of sodium chloride.

- ☐ 4
- ☐ 3
- ☐ 1
- ☐ 2

Question No.53

4.00

Bookmark ☐

Statement: Ten Candidates, who were on the waiting list could finally be admitted to the course.

Assumptions:

I. A large of number of candidates were on the waiting list.

II. Wait listed candidates do not ordinarily get admission.

- ☐ If both I and II are implicit
- ☐ If neither I nor II is implicit
- ☐ If only assumption II is implicit
- ☐ If only assumption I is implicit

Question No.54

4.00

Bookmark ☐

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

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

Question No.55

4.00

Bookmark ☐

Statement: Apart from it's entertainment value of Television, it's educational value cannot be ignored

Assumptions:

I. People take Television to be the means of entertainment only.

II. The educational value of Television is not realized properly

- ☐ If both I and II are implicit
- ☐ If neither I nor II is implicit
- ☐ If only assumption II is implicit
- ☐ If only assumption I is implicit

Question No.56

4.00

Bookmark ☐

Five membered hetro cyclic compounds are

- ☐ Imidazole, oxazole and Pyrimine

- ☐ Imidazole, Oxazole and Furan
- ☐ Furan, quinoline and purine
- ☐ Pyridazine, pyrimidine and pyrazine
- ☐ Furan, Pyrrole and Thiophene

Question No.57

4.00

Bookmark ☐

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

- ☐ $\frac{h}{2mqv}$
- ☐ $\frac{h}{\sqrt{2mqv}}$
- ☐ $\frac{h}{2E_k qV}$
- ☐ $\frac{h}{\sqrt{2E_k qV}}$

Question No.58

4.00

Bookmark ☐

What is the degree of polymerization of polyethylene? Assume the Molecular mass of polyethylene is 140000.

- ☐ 5384
- ☐ 5833
- ☐ 8750
- ☐ 5000

Question No.59

4.00

Bookmark ☐

Heat is transferred to a heat engine from a furnace at a rate of 70 MW. If the rate of waste heat rejection to a nearby river is 40 MW, the thermal efficiency of this heat engine is

- ☐ 49.20%
- ☐ 42.80%
- ☐ 40.40%
- ☐ 44.60%

Question No.60

4.00

Bookmark ☐

In a transistor, emitter current is

- ☐ slightly less than collector
- ☐ equal to collector
- ☐ equal to base current
- ☐ slightly more than collector

Question No.61

4.00

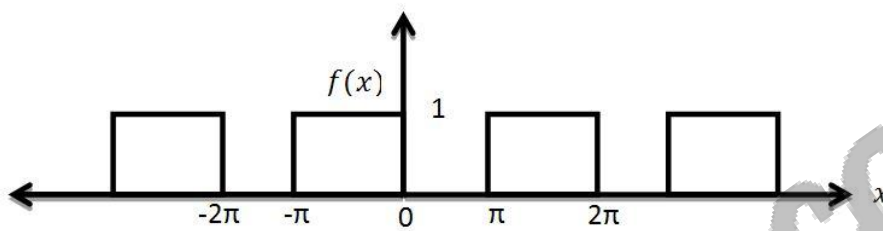
Bookmark ☐

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

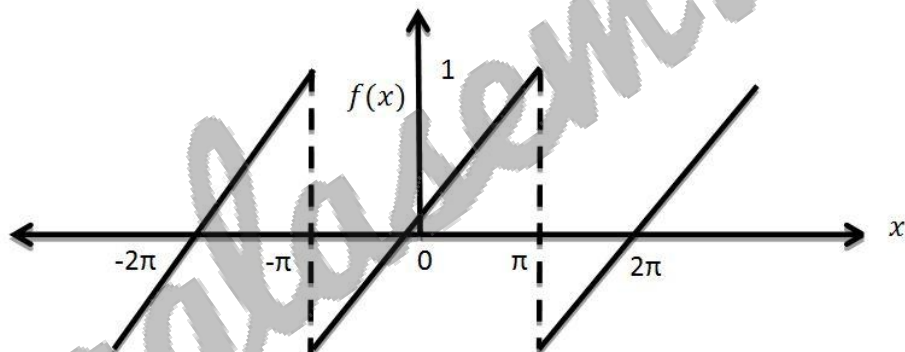
- ☐ $\lambda^3 + 7\lambda^2 + 2\lambda + 38 = 0$
- ☐ $\lambda^3 + 7\lambda^2 + 38 = 0$
- ☐ $\lambda^3 - 7\lambda^2 + 2\lambda + 36 = 0$
- ☐ $\lambda^3 - 7\lambda^2 + 36 = 0$

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

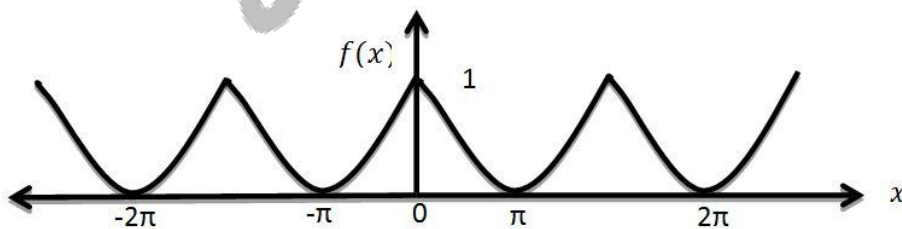
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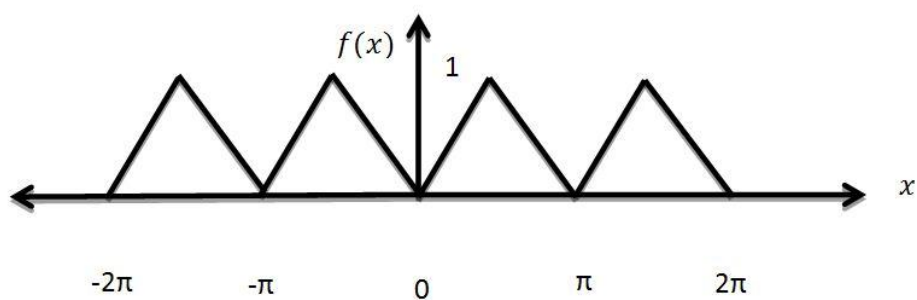
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Question No.63

4.00

Bookmark ☐

In a magnetic material, the field strength is found to be 10^6 A m^{-1} . If the magnetic susceptibility of the material is 0.5×10^{-5} , calculate the intensity of magnetization and the flux density of the material?

- ☐ 6 A m^{-1}
- ☐ 5 A m^{-1}
- ☐ 3 A m^{-1}
- ☐ 4 A m^{-1}

Question No.64

4.00

Bookmark ☐

Differential calculus involves an operator called

- ☐ Laplace operator
- ☐ differential operator
- ☐ athematic operator
- ☐ integral operator

Question No.65

4.00

Bookmark ☐

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

- ☐ -5,4
- ☐ 6,-5
- ☐ 4,-5
- ☐ 6,5

Question No.66

4.00

Bookmark ☐

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

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

Question No.67

4.00

Bookmark ☐

The function $f(x) = x^3 - 6x^2 + 3x + 25$ has

- ☐ a maxima at $x = 3$ and a minima at $x = 1$
- ☐ no maxima, but a _minima at $x = 1$
- ☐ a maxima at $x = 1$, but no minima
- ☐ a maxima at $x = 1$ and a minima at $x = 3$

Question No.68

4.00

Bookmark ☐

Thermoplast have high degree of plasticity because

- (i) Plastical deformation increases with increasing temperature

- (ii) Secondary bonds are broken more readily and ultimately melting it
- (iii) Plactical deformation decreases with increasing temperature

Select the correct option using the code given below.

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

Question No.69

4.00

Bookmark ☐

The first antibody that invading microorganism is

- ☐ IgM
- ☐ IgA
- ☐ IgG
- ☐ IgJ

Question No.70

4.00

Bookmark ☐

The change of a single nitrogen base in a DNA sequence is

- ☐ Lethal mutation
- ☐ Point mutation
- ☐ Site directed mutagenesis
- ☐ Deletion mutation

Question No.71

4.00

Bookmark ☐

Select the Pair that best represents the relationship that is given in the question:

Explore : Discover

- ☐ Books : Knowledge
- ☐ Research : Learn
- ☐ Think : Relate
- ☐ Tree : Wood

Question No.72

4.00

Bookmark ☐

Find the odd one out?

- ☐ Deposit
- ☐ Withdrawal
- ☐ Deduction
- ☐ Debit

Question No.73

4.00

Bookmark ☐

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 \AA)

- ☐ 8×10^{-8}
- ☐ 7.8814×10^{-5}
- ☐ 2.51×10^{-5}
- ☐ 3.14

Question No.74

4.00

Bookmark ☐

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.75

4.00

Bookmark ☐

The Calculate the degrees of freedom in an aqueous solution of acetic acid.

- ☐ 2
- ☐ 1
- ☐ 4
- ☐ 3

Question No.76

4.00

Bookmark ☐

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

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

Question No.77

4.00

Bookmark ☐

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

- ☐ Parabola
- ☐ Line
- ☐ Circle
- ☐ Hyperbola

Question No.78

4.00

Bookmark ☐

_____ is one of a pair of genes that appear at a particular location on a particular chromosome and control the same characteristic

- ☐ DNA
- ☐ Allele
- ☐ Chromosome
- ☐ RNA

Question No.79

4.00

Bookmark ☐

Polar form of a complex number is

- ☐ $r(\cos\theta + i\sin\theta)$
- ☐ $r(\tan\theta + i\cot\theta)$
- ☐ $r(\sin\theta + i\cos\theta)$
- ☐ $r(\sec\theta + i\csc\theta)$

Question No.80

4.00

Bookmark ☐

Which of the following is even function?

- ☐ $\tan x$
- ☐ $\sin x$
- ☐ x^3
- ☐ $\cos x$

Question No.81

4.00

Bookmark ☐

Choose the best antonym of the italicized word.

The deliberate *suavity* of Olaf's behavior made the emotions of the audience volatile.

- ☐ impetuosity
- ☐ pleasantness
- ☐ stupidity
- ☐ politeness

Question No.82

4.00

Bookmark ☐

The first Brillouin zone for a FCC structure is

- ☐ Rhombic dodecahedron
- ☐ Hexagon
- ☐ Cube
- ☐ Truncated octahedron

Question No.83

4.00

Bookmark ☐

Being awarded the Best Singer in 2010 marked a _____ in her life.

- ☐ yardstick
- ☐ sign-post
- ☐ memorial
- ☐ milestone

Question No.84

4.00

Bookmark ☐

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

- ☐ austenite
- ☐ martensite
- ☐ twinning
- ☐ detwinning

Question No.85

4.00

Bookmark ☐

Choose the best synonym of the italicized word.

Dr. Elango is in the habit of using *obsolete* words.

- ☐ wrong
- ☐ simple
- ☐ outdated
- ☐ difficult

Question No.86

4.00

Bookmark ☐

_____ is a specialized type of cell division that reduces the chromosome number by half

- ☐ Dialysis
- ☐ Meiosis
- ☐ Mitosis
- ☐ zygote

Question No.87

4.00

Bookmark ☐

Viruses largely lack metabolic machinery of their own to generate energy or to synthesize

- ☐ Fat
- ☐ Alcohol
- ☐ Protein
- ☐ Glucose

Question No.88

4.00

Bookmark ☐

When their father died, their elder brother sold the old house and _____ in a small flat in a far-off suburb

- ☐ set them up
- ☐ put them down
- ☐ set them down
- ☐ put them up

Question No.89

4.00

Bookmark ☐

If A and B are square matrices of size $n \times n$, then which of the following statement is not true?

- ☐ $\det(kA) = k^n \det(A)$
- ☐ $\det(A + B) = \det(A) + \det(B)$
- ☐ $\det(A^T) = 1/\det(A^{-1})$
- ☐ $\det.(AB) = \det(A) \det(B)$

Question No.90

4.00

Bookmark ☐

Satellite contains _____

- ☐ Ni, Cu and Al
- ☐ Co, V and Ni
- ☐ Ni, Sc and Zn
- ☐ Co, Cr, and W

Question No.91

4.00

Bookmark ☐

The integral

$$\lim_{a \rightarrow \infty} \int x^{-4} dx$$

- ☐ converges to $1/3$
- ☐ converges to 0
- ☐ diverges
- ☐ converges to $-1/a^3$

Question No.92

4.00

Bookmark ☐

A Laplace Transform exists when _____ A) The function is piece-wise continuous

B) The function is of exponential order

C) The function is piecewise discrete

D) The function is of differential order.

- ☐ A & D
- ☐ C & D
- ☐ A & B

☐ B & C

Question No.93

4.00

Bookmark ☐

(A) Statement: Fused silica glass is used in the application requiring low thermal expansion

(B) Reason: It is highly viscous even in the molten state because of the Si-O bond

- ☐ Both (A) & (B) are True
☐ (A) False & (B) True
☐ Both (A) & (B) are False
☐ (A) True & (B) False

Question No.94

4.00

Bookmark ☐

Choose the best synonym of the italicized word.

Children of excessively indulgent parents often become very *recalcitrant*.

- ☐ disobedient
☐ indolent
☐ insolent
☐ dependent

Question No.95

4.00

Bookmark ☐

Which one of the following is not basic component of Materials Science?

- ☐ Properties
☐ Performance
☐ Structure
☐ Cost

Question No.96

4.00

Bookmark ☐

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 $P = \frac{i\hbar}{2\pi} \left(\frac{\partial}{\partial t} \right)$
(iv) $E_n = (2n+1) \frac{h\omega}{2\pi}$
- ☐ (i) & (ii)
☐ (ii) & (iv)
☐ (i), (ii) & (iii)
☐ (i), (ii) & (iv)

Question No.97

4.00

Bookmark ☐

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

- ☐ 2
☐ 2y
☐ 2x + 2y
☐ 0

Question No.98

4.00

Bookmark ☐

- ☐ 4
☐ 2

- ☐ 3
- ☐ 1

Question No.99

4.00

Bookmark ☐

Solution of equation on an open interval is a pair of linearly independent solution on that interval is called

- ☐ basis
- ☐ code
- ☐ base
- ☐ core

Question No.100

4.00

Bookmark ☐

Nidhi walks 10 metres in front and 10 metres to the right. Then every time turning to her left, she walks 5, 15 and 15 metres respectively. How far is Nidhi now from her starting point?

- ☐ 10 metres
- ☐ 5 metres
- ☐ 15 metres
- ☐ None of the above

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Sr No.	MTECH NanoScience and Technology
1	In the series 357,363,369,..... What will be the 10th term?
Alt1	405
Alt2	411
Alt3	413
Alt4	417

2	Choose word from the given options which bears the same relationship to the third word, as the first two bears: Moon: Satellite :: Earth : ?
Alt1	Sun
Alt2	Planet
Alt3	Solar System
Alt4	Asteroid

3	Door is related to Bang in the same way as Chain is related to?.....
Alt1	Thunder
Alt2	Clinch
Alt3	Tinkle
Alt4	Clank

4	Select the lettered pair that has the same relationship as the original pair of words: Emollient: Soothe
Alt1	Dynamo: Generate
Alt2	Elevation: Level
Alt3	Hurricane: Track
Alt4	Precipitation: Fall

5	Which of the following is the same as Count, List, Weight?
Alt1	Compare
Alt2	Sequence
Alt3	Number
Alt4	Measure

6	Spot the defective segment from the following:
Alt1	The downtrodden
Alt2	needs
Alt3	to be uplifted
Alt4	on a war footing

7	Choose the meaning of the idiom/phrase from among the options given: A close shave
Alt1	a nice glance
Alt2	a narrow escape
Alt3	an intimate
Alt4	a triviality

8	Lightning ----- in the same place twice.
Alt1	doesn't hit
Alt2	never strikes
Alt3	never attacks
Alt4	never falls

9	Choose the option closest in meaning to the given word: FLIPPANT
Alt1	serious
Alt2	unsteady
Alt3	irreverent
Alt4	caustic

10	Choose the antonymous option you consider the best: OBSOLETE
Alt1	obscure
Alt2	hackneyed
Alt3	current
Alt4	grasp

11	Akash scored 73 marks in subject A. He scored 56% marks in subject B and X marks in subject C. Maximum marks in each subject were 150. The overall percentage marks obtained by Akash in all the three subjects were 54%. How many marks did he score in subject C ?
Alt1	84
Alt2	86
Alt3	79
Alt4	73

12	A person starts from his house and travels 6 Km towards the West, he then travelled 4 Km towards his left and then travels 8 Km towards west and 3 Km towards South. Finally he turns right and travels 5 Km. What is the horizontal distance he has travelled from his house ?
Alt1	7 Km
Alt2	15 Km
Alt3	23 Km
Alt4	19 Km

13	If 1st Jan 2012 is a Tuesday then on which day of the week will 1st Jan 2013 fall ?
Alt1	Wednesday
Alt2	Thursday
Alt3	Friday
Alt4	Saturday

14	One morning after sunrise, Reeta and Kavita were talking to each other face to face at University. If Kavita's shadow was exactly to the right of Reeta, which direction was Kavita facing ?
Alt1	North
Alt2	South
Alt3	East

Alt4	West
------	------

15	In an exam every candidate took History (or) Geography (or) both. 74.8% took History and 50.2% took Geography. If the Total number of candidates is 1500, how many took History and Geography both?
Alt1	400
Alt2	350
Alt3	750
Alt4	375

16	Which word includes the larger % of Vowels?
Alt1	GOOGLE
Alt2	AMAZON
Alt3	FACE BOOK
Alt4	DOE

17	A= Least prime >24 ; B=Greatest prime <28 ; Then
Alt1	$A > B$
Alt2	$A < B$
Alt3	$A = B$
Alt4	None

18	CL X VIII refers
Alt1	861
Alt2	701
Alt3	168
Alt4	107

19	Which of the following is larger than $\frac{3}{5}$?
Alt1	$\frac{1}{2}$
Alt2	$\frac{39}{50}$
Alt3	$\frac{7}{25}$
Alt4	$\frac{59}{100}$

20	Mr. Babu travelled 1200 km by air which formed $\frac{2}{5}$ of his trip. One third of the whole trip, he travelled by car and the rest of the journey was by train. What was the distance travelled by train?
Alt1	600 km
Alt2	700 km
Alt3	800 km
Alt4	900 km

21	During electrolysis:-
Alt1	Anion get reduced
Alt2	Cation get oxidized
Alt3	Anion get oxidized
Alt4	Both anion and cations get reduced

22	The key intermediates in the synthesis of phospholipids is:-
Alt1	DCP diacyl glycerol
Alt2	CDP diacyl glycerol
Alt3	CP diacyl glycerol
Alt4	Minimum number of times a fair coin must be tossed so that the probability of getting at least one head is atleast 0.95 is:-

23	Minimum number of times a fair coin must be tossed so that the probability of getting at least one head is atleast 0.95 is:-
Alt1	7
Alt2	6
Alt3	4
Alt4	5

24	Requirement for cross-slip movement of dislocation:-
Alt1	No preferred slip plane
Alt2	Preferred slip plane
Alt3	No preferred slip direction
Alt4	Preferred slip direction

25	Matix of cell wall is made of:-
Alt1	Hemicellulose
Alt2	Glycoprotein
Alt3	Cellulose
Alt4	Pectin

26	If the plane polarised light, whose plane of vibration inclined at an angle of 45° to the optic axis, is incident on a quarter wave plate, the emergent light is:-
Alt1	Plane polarised light
Alt2	Circularly polarised light
Alt3	Elliptically polarised light
Alt4	None of these

27	The value of α for which the quadratic equation $x^2 - (\sin\alpha - 2)x - (1 + \sin\alpha) = 0$ has roots whose sum of squares is least, is:-
Alt1	$\pi/3$
Alt2	$\pi/6$
Alt3	$\pi/2$
Alt4	$\pi/4$

28	Frictional energy is dissipated by:-
Alt1	wear
Alt2	wear and heat
Alt3	wear and sound
Alt4	wear, heat and sound

29	Which of the following is a malachite ore?
----	--

Alt1	$\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$
Alt2	Cu_2CO_3
Alt3	CuCO_3
Alt4	Cu_2O

30	Let a, b, c be distinct non-zero real numbers such that a^2, b^2, c^2 are in harmonic progression and a, b, c are in arithmetic progression, then:-
Alt1	$2b^2 - ac = 0$
Alt2	$4b^2 - ac = 0$
Alt3	$2b^2 + ac = 0$
Alt4	$4b^2 + ac = 0$

31	Which of the following not allotrope of carbon?
Alt1	C_{60}
Alt2	Graphite
Alt3	C_{22}
Alt4	Diamond

32	The stress to strain ratio is known as:-
Alt1	Hall-Petch relation
Alt2	Toughness
Alt3	Eley-Rideal relation
Alt4	Young's modulus

33	The scattering amplitude can be obtained by substituting the unperturbed wave function in the integral, such an approximation is called:-
Alt1	Born approximation
Alt2	WKB approximation
Alt3	Bohr approximation
Alt4	None of these

34	The correct option is " Born approximation "
Alt1	Planck's T ³ law
Alt2	Einstein's law
Alt3	Stefan's T ³ law
Alt4	Debye's T ³ law

35	The experimental technique most suitable for determination of 3D structure of crystalline solid:-
Alt1	XRD
Alt2	Polarimetry
Alt3	FT-IR
Alt4	UV-Vis spectroscopy

36	A flux of 100 lumen falls normally on a steady table 0.5 m 1 m. The illumination on the table is:-
Alt1	50 lux
Alt2	25 lux
Alt3	200 lux

Alt4	100 lux
------	---------

37	Among the following which element does not exhibit allotropy?
Alt1	chlorine
Alt2	hydrogen
Alt3	tin
Alt4	carbon

38	The wave whose amplitude is the same at any point in perpendicular to specified direction is called:-
Alt1	Wave equation
Alt2	Rectangular wave
Alt3	Plane wave
Alt4	None of these

39	rRNA present in 40 S subunit of ribosome is:-
Alt1	5 S
Alt2	5.8 S
Alt3	18 S
Alt4	16 S

40	$\lim_{x \rightarrow 0} \frac{\sin(\pi(1 - \sin^2 x))}{\tan^2 x}$ is equal to:-
Alt1	$-\pi$
Alt2	$\pi/2$
Alt3	1
Alt4	π

41	Let $ z_1 = 30$ and $ z_2 + 5 + 12i = 13$, then minimum value of $ z_2 - z_1 $ is:-
Alt1	2
Alt2	6
Alt3	4
Alt4	None of these

42	The resistance of photo resistive cell _____.
Alt1	Remains constant irrespective of the light intensity incident upon it
Alt2	Increases with increase in light intensity
Alt3	Decreases with increase in light intensity in an exponential manner
Alt4	Decreases with increase in light intensity in a linear manner

43	Hydrophilic chemical of cell wall is:-
Alt1	Suberin

Alt2	Fat
Alt3	Lignin
Alt4	Pectin

44	Coefficient of x^5 in the expansion of the product $(1 + 2x)^6 (1 - x)^7$ is:-
Alt1	170
Alt2	171
Alt3	160
Alt4	172

45	Identify the wrong statement in the following:-
Alt1	Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table
Alt2	Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius
Alt3	Atomic radius of the elements increases as one moves down the first group of the periodic table
Alt4	Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius

46	The time period of oscillation of a bar magnet suspended horizontally along the magnetic meridian is T_0 . If this magnet is replaced by another magnet of the same size and pole strength, but double the mass, the new time period will be:-
Alt1	$T_0/\sqrt{2}$
Alt2	$\sqrt{2} T_0$
Alt3	$2 T_0$
Alt4	$T_0/2$

47	The eigen value of a hermitian matrix are a) imaginary b) real c) variable d) constant. The wave function corresponding to two different Eigen values are:-
Alt1	Orthogonal
Alt2	Monoclinic
Alt3	Triclinic
Alt4	None of these

48	In general bonding energy values are higher for _____ bonds.
Alt1	ionic
Alt2	hydrogen
Alt3	covalent
Alt4	metallic

49	Which of the following ions bind strongly to valinomycin?
Alt1	K^+
Alt2	Al^{3+}
Alt3	Na^+
Alt4	Ca^{2+}

50	What is active form of mannose in the synthesis of mannose-containing carbohydrate chains in glycoproteins?
Alt1	Uridinediphosphate mannose

Alt2	Adenosine diphosphate mannose
Alt3	Guanosinediphosphate mannose
Alt4	Cytidinediphosphate mannose

51	Sedimentation unit of ribosome is:-
Alt1	Svedberg (S)
Alt2	mili-micron (m)
Alt3	micronm()
Alt4	Angstrom (Å)

52	Ballistic tests are used in magnetic measurements for _____.
Alt1	Determination of B-H curve of the specimen only
Alt2	Determination of hysteresis loop of the specimen only
Alt3	Determination of flux density, magnetizing force and B-H curve and hysteresis loop of the specimen
Alt4	Finding out iron losses in the specimen

53	The covalent bond having highest bond dissociation energy is:-
Alt1	C = C
Alt2	C≡O
Alt3	C = Si
Alt4	O =O

54	Which one of the following oxides crystallizes into fluorite structure?
Alt1	MgAl ₂ O ₄
Alt2	BaTiO ₃
Alt3	Al ₂ O ₃
Alt4	UO ₂

55	Vulcanization refers to:-
Alt1	extrusion
Alt2	strengthening of rubber
Alt3	injection moulding
Alt4	addition polymerization

56	Middle lamella contains:-
Alt1	Lignin
Alt2	Pectate
Alt3	Cutin
Alt4	Cellulose

57	Aging is characterized by:-
Alt1	Increased catabolism
Alt2	Increased anabolism
Alt3	Decline in metabolic activity
Alt4	Increased metabolic activity

58	According to VSEPR theory, the molecules/ion having ideal tetrahedral shape is:-
----	--

Alt1	S2Cl2
Alt2	SO42-
Alt3	SF4
Alt4	SO2Cl2

59	The EPR spectrum of phenyl radical (C6H5*) shows:-
Alt1	24 lines
Alt2	36 lines
Alt3	6 lines
Alt4	18 lines

60	An assembly of fermions is known as:-
Alt1	Fermi-Dirac gas
Alt2	Bose-Einstein gas
Alt3	Maxwell Dirac gas
Alt4	None of these

61	The existence of unique solution for the system of equations, $x + y + z = p$, $5x - y + qz = 10$ and $2x + 3y - z = 6$ depends on:-
Alt1	neither 'p' nor 'q'
Alt2	p' only.
Alt3	q' only.
Alt4	p' and 'q' both

62	The number of linearly independent Eigen function is called:-
Alt1	System of Degeneracy
Alt2	Degree of Degeneracy
Alt3	Degeneracy
Alt4	None of these

63	Healing of cuts and wounds is:-
Alt1	Repair
Alt2	Dedifferentiation
Alt3	Growth
Alt4	Regeneration

64	Monochromatic green light of wavelength $5 \times 10^{-7} \text{m}$ illuminates a pair of narrow slits 1.0mm apart. The separator of bright lines on the interference pattern formed on a screen 2m away is:-
Alt1	1.00mm
Alt2	0.10mm
Alt3	0.25mm
Alt4	0.40mm

65	According to vanderwaal's equation of state, the critical volume is:-
Alt1	4b
Alt2	3b
Alt3	2b

Alt4	b
------	---

66	The reversible Sol-gel transformation is called:-
Alt1	Electrophoresis
Alt2	Thioxotropy
Alt3	De-emulsification
Alt4	None of these

67	With tempering temperature, the product becomes:-
Alt1	tougher
Alt2	softer
Alt3	stronger
Alt4	harder

68	All of the following are true about lasers except:-
Alt1	The light is emitted only in pulses
Alt2	The light doesn't diverge significantly
Alt3	Light is essentially all the same wavelength
Alt4	Light waves are in phase

69	In molecular H ₂ O, NH ₃ and CH ₄ :-
Alt1	The hybridization are same
Alt2	The bond angles are same
Alt3	The bond distances are same
Alt4	The shapes are same

70	If a curve passes through (1, 1) and tangent at any point 'P' on it cuts the axes at 'A' and 'B' , where point 'P' bisects the segment AB , then curve is given by:-
Alt1	$x^2 + y^2 = 2$
Alt2	$xy^2 = 1$
Alt3	$xy = 1$
Alt4	$x^2y = 1$

71	For differential equation $\left(\frac{dy}{dx}\right)^2 - x\left(\frac{dy}{dx}\right) + y = 0$, the solution can be given by:-
Alt1	$y = 2x^2 - 4$
Alt2	$y = 2 + x$
Alt3	$y = 2x - 4$
Alt4	$y = 2x$

72	For a spontaneous reaction, e.m.f of the cell is:-
Alt1	Zero

Alt2	Negative
Alt3	Fixed
Alt4	Positive

73	A steam engine converts heat energy into _____.
Alt1	Magnetic energy
Alt2	Electrical energy
Alt3	Chemical energy
Alt4	Mechanical energy

74	Among the following C-O bond order is linear in:-
Alt1	[Mn (CO) ₆] ⁺
Alt2	Fe(CO) ₅
Alt3	[V(CO) ₆] ⁻
Alt4	Cr(CO) ₆

75	Extra uridine rich small sized RNA is:-
Alt1	sn RNA
Alt2	sc RNA
Alt3	5.8 S RNA
Alt4	5 S RNA

76	The most common type of reproduction in bacteria is:-
Alt1	Budding
Alt2	Binary fission
Alt3	Binary fusion
Alt4	Sexual reproduction

77	Regulated unit of genetic material is termed:-
Alt1	Regulator gene
Alt2	Okazaki segment
Alt3	Operator gene
Alt4	Operon

78	Ferrites are:-
Alt1	paramagnetic
Alt2	ferrimagnetic
Alt3	ferromagnetic
Alt4	piezoresistive

79	Which among the following is not the non-destructive method of testing materials?
Alt1	magnetic particle inspection
Alt2	radiography
Alt3	X-ray diffraction
Alt4	dye penetrant test

80	Transformer cores are made from:-
----	-----------------------------------

Alt1	Cu-Si alloy
Alt2	Fe-Si alloy
Alt3	Cu-Co alloy
Alt4	Fe-Cu alloy

81	Albinism is:-
Alt1	Genetic disorder
Alt2	Environment related disorder
Alt3	Infectious disease
Alt4	Deficiency disease

82	Select the false statement about catalyst:-
Alt1	Catalyst increases the reaction rate
Alt2	Catalyst gets regenerated after the process
Alt3	Catalyst alters the thermodynamic path
Alt4	Catalyst reduces the activation energy

83	Kreb's cycle takes place in:-
Alt1	Chloroplast
Alt2	Mitochondria
Alt3	Ribosome
Alt4	Endoplasmic reticulum

84	Melting point of ice _____.
Alt1	Is proportional to cube of pressure
Alt2	Decreases with increase in pressure
Alt3	Increases with increase in pressure
Alt4	Does not depend upon pressure

85	If pair of lines $3x^2 - 2pxy - 3y^2 = 0$ and $5x^2 - 2qxy - 5y^2 = 0$ are such that each pair bisects the angle between the other pair, then pq is equal to:-
Alt1	-5
Alt2	-20
Alt3	-1
Alt4	-15

86	Hydrogen gas is not liberated when the following metal is added to dilute HCL:-
Alt1	Mg
Alt2	Ag
Alt3	Sn
Alt4	Zn

87	Find out the statement which is incorrect about Duralumin:-
Alt1	It can be forged
Alt2	It has good machinability
Alt3	It is lighter than aluminum
Alt4	It undergoes age hardening

88	If the chords of contact of tangents from $(-4, 2)$ and $(2, 1)$ to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ are at right angle, then eccentricity of the hyperbola is:-
Alt1	$\sqrt{\frac{3}{2}}$
Alt2	$\sqrt{3}$
Alt3	$\sqrt{\frac{5}{2}}$
Alt4	$\sqrt{2}$

89	During adsorption:-
Alt1	ΔG will be equal to zero
Alt2	ΔG will be negative
Alt3	ΔG will be positive
Alt4	None of these

90	Vinegar is synthesized from alcohol by:-
Alt1	Azotobacter
Alt2	Rhizobium
Alt3	Lactobacillus bacteria
Alt4	Bacilli aceti bacteria

91	The formula used to calculate the size of the particle is known as:-
Alt1	Scherrer
Alt2	Bode
Alt3	Kirkendall
Alt4	Laue

92	During complete metabolism of glucose the number of ATP formed from corresponding number of ADP molecules, OR the net gain of energy from one gram of glucose during aerobic respiration is:-
Alt1	38 ATP
Alt2	16 ATP
Alt3	2 ATP
Alt4	36 ATP

93	What is the integral of $(2x + 3)(2x - 5)$ with respect to x?
Alt1	$8x^3 - 15x^2 + c$
Alt2	$x^4 - 2x^3 - 15x^2 + c$
Alt3	$8x - 4 + c$
Alt4	$x^3 - 2x^2 - 15x + c$

94	Which of the following is an intensive property:-
Alt1	Surface tension
Alt2	Temperature
Alt3	Viscosity
Alt4	All of these

95	Link between carbohydrate and fat metabolism or between glycolysis, Kreb's cycle and β -oxidation of fatty acid is:-
Alt1	Pyruvic acid
Alt2	Oxaloacetate
Alt3	Citric acid
Alt4	Acetyl CoA

96	If equations $\vec{r} \times \vec{a} = \vec{b}$ and $\vec{r} \times \vec{c} = \vec{d}$ are consistent, then:-
Alt1	$b \cdot c = a \cdot d = 0$
Alt2	$a \cdot d + b \cdot c = 0$
Alt3	$a \cdot d + c \cdot d = 0$
Alt4	$a \cdot d = c \cdot d$

97	Fischer-Tropsch process is used for the manufacture of:-
Alt1	Synthetic petrol
Alt2	Ethanol
Alt3	Benzene
Alt4	Ethanoic acid

98	The matrix A satisfies the condition $A = A^T$ is:-
Alt1	identity
Alt2	skew-symmetric
Alt3	symmetric

Alt4	adjoint
------	---------

99	Evolution of CO ₂ is more than intake of oxygen when:-
Alt1	Glucose is respired
Alt2	Fats are respired
Alt3	Organic acids are respired
Alt4	Sucrose is respired

100	If the order of matrix A is $n \times p$ and the order of matrix B is $p \times m$, what is order of matrix AB:-
Alt1	$p \times p$
Alt2	$n \times m$
Alt3	$n \times p$
Alt4	$p \times m$

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The ability of the material to absorb energy on elastic deformation is known as:-

- ☐ Impact
- ☐ Resilience
- ☐ creep
- ☐ Toughness

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Membrane proteins are:-

- ☐ Aligned diagonally
- ☐ Arranged in a zigzag manner
- ☐ Symmetrically placed
- ☐ Asymmetrically placed

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The half-life of a zero order reaction ($A \rightarrow P$) is given by (K = rate constant):-

- ☐ $t_{1/2} = [A]_0/k$
- ☐ $t_{1/2} = 1/ k [A]_0$
- ☐ $t_{1/2} = 2.303/k$
- ☐ $t_{1/2} = [A]_0/2k$

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Plastids storing proteins are called:-

- ☐ Aleuroplasts
- ☐ Oleosomes
- ☐ Phaeoplasts
- ☐ Elaioplasts

5 of 100

192 PU_2016_305_E

The fatigue strength of mild steel is:-

- ☐ lower than its yield strength
- ☐ equal to its tensile strength
- ☐ equal to its yield strength

- ☐ more than its tensile strength

6 of 100

168 PU_2016_305_E

The number of solutions of equation $6|\cos x| - x = 0$ in $[0, 2\pi]$ are:-

- ☐ 2
☐ 6
☐ 3
☐ 4

7 of 100

181 PU_2016_305_E

In general, more ductile material has the following structure:-

- ☐ body centered cubic lattice
☐ diamond cubic
☐ hexagonal close packed
☐ face centered cubic

8 of 100

156 PU_2016_305_E

Area of region on the complex plane which is bounded by the curve $|z + 2i| + |z - 2i| = 8$ is:-

- ☐ $3\sqrt{8}\pi$
☐ $16\pi\sqrt{3}$
☐ $4\sqrt{12}\pi$
☐ None of these

9 of 100

121 PU_2016_305_E

The e.m.f around a closed path is equal to negative rate of change of magnetic flux linked with the path in significance of:-

- ☐ Maxwell's first equation
☐ Maxwell's second equation
☐ Maxwell's third equation
☐ Maxwell's fourth equation

10 of 100

103 PU_2016_305_E

If horizontal and vertical components of the earth's magnetic field are equal at a certain place, then the angle of dip at that place is:-

- ☐ 22.50 N

- ☐ 11.25 N
- ☐ 45.00 N
- ☐ 7.20 N

11 of 100

148 PU_2016_305_E

A curve has equation $y = 3x^2 - 7x - 2$.

What is the gradient of the tangent at the point where $x=3$?

- ☐ 4
- ☐ 9
- ☐ 3
- ☐ 11

12 of 100

191 PU_2016_305_E

As compared to engineering stress strain curve, the true stress strain curve is:-

- ☐ crosses the engineering curve
- ☐ parallel to the engineering curve
- ☐ below and to the right
- ☐ above and to the left

13 of 100

194 PU_2016_305_E

The shear modulus, G , of plastic is related to the elastic modulus, E , and the Poisson ratio, ν , through the equation:-

- ☐ $E = (1-\nu) G$
- ☐ $E = (1+\nu) G$
- ☐ $E = 2(1-\nu) G$
- ☐ $E = 2(1+\nu) G$

14 of 100

179 PU_2016_305_E

The percentage of carbon in cast iron is:-

- ☐ 4.5-6.5%
- ☐ 2.5-4%
- ☐ 0.5-1.5%
- ☐ less than 0.5%

15 of 100

114 PU_2016_305_E

The particles are assumed to obey Pauli's exclusion principle in:-

- ☐ Maxwell-Boltzmann statistics
- ☐ Bose-Einstein statistics
- ☐ Fermi-Dirac statistics
- ☐ None of these

16 of 100

201 PU_2016_305_E

Eukaryotic cells devoid of Endoplasmic reticulum are:-

- ☐ Mature erythrocytes
- ☐ Liver cells
- ☐ Kidney cells
- ☐ Mature leucocytes

17 of 100

120 PU_2016_305_E

Photons, phonons, helium, nuclei and mesons are treated with help of:-

- ☐ Fermi-Dirac statistics
- ☐ Bose-Einstein statistics
- ☐ Maxwell-Boltzmann statistics
- ☐ None of these

18 of 100

218 PU_2016_305_E

Which of the following bacteria are responsible for the conversion of pyruvic acid to propionic acid through oxaloacetic acid formation?

- ☐ Enterobacter
- ☐ Clostridium
- ☐ Lactobacillus
- ☐ Propionobacterium

19 of 100

175 PU_2016_305_E

Permanent deformation is related to:-

- ☐ fatigue
- ☐ plasticity
- ☐ creep
- ☐ elasticity

20 of 100

214 PU_2016_305_E

Mammals can regenerate:-

- ☐ Liver
- ☐ Urinary bladder
- ☐ Brain
- ☐ Lung

21 of 100

152 PU_2016_305_E

Let $a, b \in \mathbb{R} - \{0\}$ and α, β, γ be the roots of the equation $x^3 + ax^2 + bx - b = 0$. If $2/\beta = 1/\alpha + 1/\gamma$, then the minimum value of $(a+b)/b$ is equal to:-

- ☐ 3/4
- ☐ 2/3
- ☐ 1/3
- ☐ 3/8

22 of 100

211 PU_2016_305_E

In human beings, which part shows the maximum increase in weight from birth to adulthood?

- ☐ Muscles
- ☐ Brain
- ☐ Skeleton
- ☐ Fat

23 of 100

144 PU_2016_305_E

The main component of the brass are:-

- ☐ Cu and Zn
- ☐ Cu and Al
- ☐ Cu and Sn
- ☐ Cu and Ni

24 of 100

162 PU_2016_305_E

Let (x, y, z) be points with integer co-ordinates satisfying the system of homogeneous equation $3x - y - z = 0$, $-3x + z = 0$, $-3x + 2y + z = 0$. Then the number of such points for which $x^2 + y^2 + z^2 \leq 100$ are:-

- ☐ 5
- ☐ 10
- ☐ 6
- ☐ 7

25 of 100

142 PU_2016_305_E

Clouds represent an example of dispersion of:-

- ☐ Liquid in gas
- ☐ Solid in gas
- ☐ Gas in liquid
- ☐ Gas in gas

26 of 100

216 PU_2016_305_E

Hereditary fructose intolerance is a condition caused by a deficiency of:-

- ☐ Phosphofructokinase
- ☐ Fructokinase
- ☐ Fructokinase 1,6-diphosphate aldolase
- ☐ Fructokinase 1-phosphate aldolase

27 of 100

186 PU_2016_305_E

Bainite forms when the transformation temperature is between pearlite and:-

- ☐ ferrite
- ☐ sorbite
- ☐ martensite
- ☐ cementite

28 of 100

135 PU_2016_305_E

In their metallic form, elements from which of the following groups are usually effective for hydrogenation catalyst:-

- ☐ Alkaline earth metals
- ☐ Halogens
- ☐ Actinides
- ☐ Pt metals

29 of 100

182 PU_2016_305_E

Psychrometry is related to the study of:-

- ☐ combustion
- ☐ moist air
- ☐ biomimetics

- ☐ luminescence

30 of 100

138 PU_2016_305_E

Random motions of colloidal particles is known as:-

- ☐ Electro osmosis
☐ Brownian movement
☐ Tyndall effect
☐ Dialysis

31 of 100

200 PU_2016_305_E

Protoplasm is:-

- ☐ Alveolar
☐ Crystallo-colloidal
☐ Fibrillar
☐ Granular

32 of 100

174 PU_2016_305_E

Cementite is a:-

- ☐ cement
☐ composite
☐ elastomer
☐ glass

33 of 100

136 PU_2016_305_E

Which of the following doesn't have a metal-metal bond?

- ☐ Al_2Cl_6
☐ Hg_2Cl_2
☐ $\text{K}_2\text{Fe}_2\text{Cl}_5$
☐ $\text{Mn}_2(\text{CO})_{10}$

34 of 100

196 PU_2016_305_E

Protein synthesis takes place on groups or clusters of ribosomes which are called:-

- ☐ Polyribosomes
☐ Ergosomes
☐ Endoplasmic Reticulum

- ☐ Polysomes

35 of 100

173 PU_2016_305_E

The typical property of ceramic is:-

- ☐ Elasticity
- ☐ low hardness
- ☐ Brittleness
- ☐ machinability

36 of 100

153 PU_2016_305_E

Consider the function

$$f(x) = (1 + m)x^2 - 2(3m + 1)x + (8m + 1), \text{ where } m \in \mathbb{R} - \{-1\}$$

The number of real values of 'm' such that $f(x) = 0$ has roots which are in the ratio 2:3 is /are:-

- ☐ 0
- ☐ 1
- ☐ 4
- ☐ 2

37 of 100

188 PU_2016_305_E

Which among the following parameters which strongly affects diffusivity?

- ☐ Presence of defects
- ☐ Lattice parameter
- ☐ Diffusing species
- ☐ Temperature

38 of 100

178 PU_2016_305_E

Which among the following has highest ductility?

- ☐ Cu
- ☐ W
- ☐ Ti
- ☐ Ni

39 of 100

146 PU_2016_305_E

The compound used in preparing antiseptic ointment:-

- ☐ Para-aldehyde
- ☐ Phenol

- ☐ Benzyl chloride
- ☐ Benzyl alcohol

40 of 100

212 PU_2016_305_E

As compared to whole body, the head of an adult human being is:-

- ☐ One-fifth
- ☐ One-seventh
- ☐ One-eighth
- ☐ One-sixth

41 of 100

149 PU_2016_305_E

Two circles have equations $x^2 + y^2 = 16$ and $(x - 2)^2 + y^2 = 4$.

Which of the following correctly describes the relative position of the two circles?

- ☐ The two circles touch externally
- ☐ The circles do not touch or intersect
- ☐ The two circles intersect
- ☐ The two circles touch internally

42 of 100

115 PU_2016_305_E

In Fermi-Dirac statistics, the particles are called fermions and in the case of Bose-Einstein statistics, the particles are called as:-

- ☐ Bosons
- ☐ Hyperons
- ☐ Mesons
- ☐ None of these

43 of 100

205 PU_2016_305_E

Glycophorin is a:-

- ☐ Cytosolic protein
- ☐ Triple α -helix
- ☐ Transmembrane protein
- ☐ Peripheral protein

44 of 100

109 PU_2016_305_E

An assembly of bosons is known as:-

- ☐ Bose-Einstein condensation
- ☐ Fermi-Dirac gas
- ☐ Bose-Einstein gas
- ☐ None of these

45 of 100

164 PU_2016_305_E

If $\log_7 \left\{ \log_5 \sqrt{(x^2 + x + 5)} \right\} = 0$, then x is equal to:-

- ☐ 4
- ☐ -2
- ☐ 3
- ☐ 2

46 of 100

127 PU_2016_305_E

The molecular geometry of IF_5 is:-

- ☐ Trigonal planar
- ☐ Linear
- ☐ Square pyramidal
- ☐ Square planar

47 of 100

150 PU_2016_305_E

A, B and C have coordinates (1, -2, 4), (5, 4, -2) and (7, 7, -5) respectively.

Here are two statements about the points A, B and C

(1) A, B and C are collinear

(2) $\left| \vec{AC} \right| : \left| \vec{BC} \right| = 2 : 1$. Which of the following is true?

- ☐ Neither statement is correct
- ☐ Only statement 1 is correct
- ☐ Only statement 2 is correct
- ☐ Both statements are correct

48 of 100

137 PU_2016_305_E

Among the following one having highest bond strength is:-

- ☐ O_2^-
- ☐ O_2^+
- ☐ O_2

☐ O_2^{2-}

49 of 100

169 PU_2016_305_E

Area enclosed by inequality $2 \leq |x+y| + |x-y| \leq 4$ is:-

- ☐ 5 sq. units
- ☐ 12 sq. units
- ☐ 8 sq. Units
- ☐ 4 sq. units

50 of 100

100 PU_2016_305_E

If $m^*h > m^*e$, then the position of Fermi energy level is:-

- ☐ Just above the centre of energy gap
- ☐ Just above valence band
- ☐ Just below conduction band
- ☐ At the centre of energy gap

51 of 100

184 PU_2016_305_E

Which micro-constituent is not the part of the iron-carbon system?

- ☐ Troostite
- ☐ Martensite
- ☐ Sorbite
- ☐ Magnesite

52 of 100

159 PU_2016_305_E

If $a, b, c, d \in \{0, 1\}$, then the probability that system of equations $ax + by = 2$; $cx + dy = 4$ is having unique solution is given by:-

- ☐ $5/8$
- ☐ $1/2$
- ☐ 1
- ☐ $3/8$

53 of 100

219 PU_2016_305_E

Enterobacter helps in production of _____ from pyruvic acid.

- ☐ Propanol
- ☐ Acetone

- ☐ Butanediol
- ☐ Ethanol

54 of 100

161 PU_2016_305_E

Let ' ω ' be the non-real cube root of unity, where $A = \begin{bmatrix} \omega & 0 & 0 \\ 0 & \omega & 0 \\ 0 & 0 & \omega \end{bmatrix}$, then A^{2010} is equal to:-

- ☐ I
- ☐ -A
- ☐ 0
- ☐ A

55 of 100

165 PU_2016_305_E

If $\log_{12} 27 = a$, then $\log_6 16$ is:-

- ☐ $2\left(\frac{4-a}{4+a}\right)$
- ☐ $2\left(\frac{3-a}{3+a}\right)$
- ☐ $4\left(\frac{3-a}{3+a}\right)$
- ☐ $3\left(\frac{3-a}{3+a}\right)$

56 of 100

158 PU_2016_305_E

If John is allowed to select at most $(n + 1)$ chocolates from a collection of $(2n + 2)$ distinct chocolates, then total number of ways by which John can select at least two chocolates are given by:-

- ☐ $2(4)^n + 4 \cdot {}^{2n+1}C_n - 2n + 3$
- ☐ $2(4)^n + {}^{2n+1}C_n - 2n - 3$
- ☐ $(4)^n + 4 \cdot {}^{2n+1}C_n - 2n + 1$
- ☐ $2(4)^n - {}^{2n+1}C_n - 2n - 3$

57 of 100

172 PU_2016_305_E

Which among the following is NOT the typical metallic property?

- ☐ Lustre
- ☐ Formability
- ☐ Ductility
- ☐ High specific heat

58 of 100

125 PU_2016_305_E

Which one of the following exhibit rotational spectra?

- ☐ H₂
- ☐ N₂
- ☐ CO₂
- ☐ CO

59 of 100

167 PU_2016_305_E

If $\log x^2 - \log 2x = 3\log 3 - \log 6$, then x is:-

- ☐ 10
- ☐ 9
- ☐ 1
- ☐ 2

60 of 100

171 PU_2016_305_E

If $y = f(x)$ and $y \cos x + x \cos y = \pi$ for all $x \in \mathbb{R}$, then $f''(0)$ is:-

- ☐ $-\pi$
- ☐ π
- ☐ 2π
- ☐ 0

61 of 100

230 PU_2016_305_M

pH value of buffer can be calculated using the equation $\text{pH} = \text{pKa} + \dots$

- ☐ $[\text{acid}]/[\text{salt}]$
- ☐ $[\text{acid}]/\text{salt}$
- ☐ $[\text{acid}]$
- ☐ $[\text{salt}]$

62 of 100

231 PU_2016_305_M

An octahedral complex is formed when hybrid orbitals of the following type are involved:-

- ☐ sp^2d^2
- ☐ d^2sp^3
- ☐ dsp^2
- ☐ sp^3

63 of 100

228 PU_2016_305_M

The complex compound in which oxidation number of metal is zero is:-

- ☐ $[Pt(NH_3)_4]Cl_2$
- ☐ $[K_4Fe(CN)_6]$
- ☐ $K_3[Fe(CN)_6]$
- ☐ $[NiCO_4]$

64 of 100

251 PU_2016_305_M

Desirable property for components to withstand shock and impact load?

- ☐ toughness
- ☐ brittleness
- ☐ strength
- ☐ stiffness

65 of 100

234 PU_2016_305_M

Ground state term for the d^7 configuration:-

- ☐ 3p
- ☐ 5d
- ☐ 1s
- ☐ 4f

66 of 100

236 PU_2016_305_M

The equation of common tangent to the curves $y = 6 - x - x^2$ and $xy = x + 3$ is:-

- ☐ $3x + y = 10$
- ☐ $3x + y = 7$
- ☐ $2x + y = 4$
- ☐ $3x - y = 8$

67 of 100

247 PU_2016_305_M

Diamagnetic materials are:-

- ☐ are magnetized in direction opposite to that of applied field
- ☐ can be magnetized in one direction only
- ☐ non magnetic
- ☐ cannot be magnetized

68 of 100

243 PU_2016_305_M

The centre of smallest circle which cuts the circles $x^2 + y^2 = 1$ and $x^2 + y^2 + 8x + 8y - 33 = 0$ orthogonally is:-

- ☐ $(\sqrt{3}, 2)$
- ☐ $(2, 2)$
- ☐ $(2\sqrt{2}, \sqrt{3})$
- ☐ $(2, 2\sqrt{2})$

69 of 100

241 PU_2016_305_M

If the straight lines $6x + 3y - 10 = 0$, $6x + Ky - 4 = 0$ and $2x + y - 3 = 0$ are concurrent, then:-

- ☐ $K = 3$
- ☐ $K \in \Phi$
- ☐ $K = 1$
- ☐ $K \in \mathbb{R}$

70 of 100

237 PU_2016_305_M

Equation of normal to curve $y = (1+x)^y + \sin^{-1}(\sin^2 x)$ at $x = 0$ is:-

- ☐ $x + y - 1 = 0$
- ☐ $x - y + 1 = 0$
- ☐ $x + y = 0$
- ☐ $x + y + 1 = 0$

71 of 100

240 PU_2016_305_M

If L_1, L_2, L_3 are three non-concurrent and non parallel lines in 2-dimensional plane, then maximum number of points which are equidistant from all the three lines is/are:-

- ☐ 3
- ☐ 2
- ☐ 1
- ☐ 4

72 of 100

258 PU_2016_305_M

Respiration is regarded as:-

- ☐ Synthetic process
- ☐ Reduction process
- ☐ Catabolic process
- ☐ Anabolic process

73 of 100

225 PU_2016_305_M

The waves of frequency 12 MHZ are emitted by a radio station. The velocity of radio waves is 3×10^8 milli per second. The wavelength of emitted waves will be _____.

- ☐ 25 m
- ☐ 36 m
- ☐ 3.6 m
- ☐ 2.5 m

74 of 100

227 PU_2016_305_M

A free electron is placed in the path of a plane electromagnetic wave. The electron will start moving _____.

- ☐ Along the magnetic field
- ☐ In a plane containing the magnetic field and the direction of propagation
- ☐ Along the electric field
- ☐ Along the direction of propagation of the wave

75 of 100

254 PU_2016_305_M

Small nuclear RNAs are involved in:-

- ☐ Splicing and processing of both rRNA and mRNA
- ☐ Splicing of RNAs
- ☐ Splicing and processing of mRNA
- ☐ Binding of DNA

76 of 100

235 PU_2016_305_M

Potential of hydrogen electrode at pH 10:-

- ☐ -0.059V
- ☐ 0.59V
- ☐ -0.59V
- ☐ 0.00 V

77 of 100

222 PU_2016_305_M

In which of the following, the speed of sound will be maximum?

- ☐ Water
- ☐ Air
- ☐ Vacuum
- ☐ Steel

78 of 100

220 PU_2016_305_M

In a nuclear reactor, the control rods are made of _____.

- ☐ Uranium-238
- ☐ Uranium-235
- ☐ Plutonium
- ☐ Cadmium

79 of 100

224 PU_2016_305_M

The displacement current arises due to _____.

- ☐ Positive charges only
- ☐ Time varying electric field
- ☐ Both positive and negative charges
- ☐ Negative charges only

80 of 100

255 PU_2016_305_M

Signal theory is related to:-

- ☐ Nervous system
- ☐ Synthesis of secretory proteins
- ☐ Emergency
- ☐ Formation of special membrane lipiol

81 of 100

262 PU_2016_305_D

Specific heat of the water is minimum at:-

- ☐ 0°C
- ☐ 0K
- ☐ 273°C
- ☐ 4°C

82 of 100

264 PU_2016_305_D

The main significance of the relativistic formula for the variation of mass with velocity is that no material body can have _____.

- ☐ A velocity equal to or greater than the velocity of light
- ☐ A velocity equal to or lesser than the velocity of light
- ☐ A velocity lesser than the velocity of light
- ☐ None of these

83 of 100

260 PU_2016_305_D

A monochromatic electromagnetic waves means that _____.

- ☐ The wave always travels in the same direction
- ☐ Electric field vector E lies in one direction only
- ☐ Magnetic field vector B must be perpendicular to the direction of propagation
- ☐ The field strength at a point varies with time according to sine or cosine function

84 of 100

297 PU_2016_305_D

Which is the final electron acceptor in respiration?

- ☐ Oxygen
- ☐ Dehydrogenase
- ☐ Cytochrome
- ☐ Hydrogen

85 of 100

269 PU_2016_305_D

The nature of ether is:-

- ☐ Amphoteric
- ☐ Acidic
- ☐ Neutral
- ☐ Slightly basic

86 of 100

273 PU_2016_305_D

The entropy of the universe is:-

- ☐ Continuously increasing
- ☐ Constant
- ☐ Zero

- ☐ Continuously decreasing

87 of 100

287 PU_2016_305_D

The corrosion resistance of stainless steel primarily arise from the presence of:-

- ☐ Ni
☐ Cr
☐ P
☐ Co

88 of 100

284 PU_2016_305_D

Addition of _____ increases the machinability of aluminium.

- ☐ Magnesium
☐ lead and bismuth
☐ Silicon
☐ Copper

89 of 100

286 PU_2016_305_D

The degree of freedom when ice, water and water vapour co-exist in equilibrium is:-

- ☐ 3
☐ 0
☐ 2
☐ 1

90 of 100

289 PU_2016_305_D

Which is not the metal joining process:-

- ☐ slip casting
☐ welding
☐ soldering
☐ brazing

91 of 100

295 PU_2016_305_D

Mineral activator needed for the enzymes carboxylase of TCA cycle is:-

- ☐ Mo
☐ Mg
☐ Fe

☐ Mn

92 of 100

267 PU_2016_305_D

There is universal equivalence between mass and energy i.e. mass may appear as energy and energy as mass is called _____.

- ☐ Mass-velocity equivalence
- ☐ Mass-energy variation
- ☐ Mass-energy equivalence
- ☐ None of these

93 of 100

277 PU_2016_305_D

Minimum distance between the ellipse $x^2 + 2y^2 = 6$ and the line $x + y - 7 = 0$ is equal to:-

- ☐ $4\sqrt{2}$
- ☐ $\sqrt{5}$
- ☐ $2\sqrt{2}$
- ☐ $\sqrt{10}$

94 of 100

281 PU_2016_305_D

When $\nabla \times \vec{A} = 0$ then the vector field is:-

- ☐ Irrotational
- ☐ Sinusoidal
- ☐ Solenoidal
- ☐ Constant

95 of 100

270 PU_2016_305_D

If 1 mol of NH_3 is mixed with 1 mol HCl in closed container to form NH_4Cl gas then:-

- ☐ $\Delta H = \Delta U$
- ☐ $\Delta H > \Delta U$
- ☐ $\Delta H < \Delta U$
- ☐ There is no relationship

96 of 100

266 PU_2016_305_D

One atomic mass unit is equal to _____.

- ☐ 931.3 MeV
- ☐ 911.3 MeV

- ☐ 913.3 MeV
- ☐ None of these

97 of 100

268 PU_2016_305_D

Saturated solution of KNO_3 is used to make salt bridge because:-

- ☐ Velocity of both are nearly same
- ☐ Velocity of K^+ is greater than NO_3^-
- ☐ KNO_3 is highly soluble in water
- ☐ Velocity of NO_3^- is greater than K^+

98 of 100

261 PU_2016_305_D

Which of the following statements is true?

- ☐ In air the sound waves are transverse and the light waves are longitudinal
- ☐ Both the sound and the light waves are transverse waves
- ☐ In air the sound waves are longitudinal and the light waves are transverse
- ☐ The sound and the light waves are both longitudinal waves

99 of 100

294 PU_2016_305_D

To a living organism which of the following has the greater amount of available energy per molecule:-

- ☐ ADP
- ☐ H_2O
- ☐ CO_2
- ☐ ATP

100 of 100

299 PU_2016_305_D

Action of ATPase needs the presence of:-

- ☐ Na^+ and K^+
- ☐ Mg^{++} and K^+
- ☐ Cu^{++} and Fe^{++}
- ☐ Ca^{++} and Mg^{++}

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1 of 100

122 PU_2015_305

Ductile fracture is characterized by:-

- ☐ shiny appearance
- ☐ cup and cone structure
- ☐ with no plastic deformation
- ☐ subsurface cracks

2 of 100

100 PU_2015_305

Cast iron known for its ----- character.

- ☐ Brittle
- ☐ Ductile
- ☐ Toughness
- ☐ Low melting point

3 of 100

120 PU_2015_305

The sample preparation process by which the structural features of a metallic sample is revealed in optical microscopy is known as:-

- ☐ implantation
- ☐ etching
- ☐ sputtering
- ☐ lithography

4 of 100

112 PU_2015_305

For a cylindrical shaft of length 'L' and radius 'r', if torque 'M' operates then shear stress is given by:-

- ☐ $2 / M \pi r^3$
- ☐ $2M / \pi r^2$
- ☐ $2M / \pi r^3$
- ☐ $2 / \pi M r^2$

5 of 100

114 PU_2015_305

Among the following bonding types which exhibit high melting point:-

- ☐ covalent
- ☐ secondary
- ☐ metallic
- ☐ ionic

6 of 100

118 PU_2015_305

For underground pipelines the commonly used joint is:-

- ☐ sleeve joint
- ☐ flange
- ☐ expansion joint
- ☐ coupling

7 of 100

106 PU_2015_305

In a four stroke cycle, the minimum temperature inside the engine cylinder occurs at the:-

- ☐ end of exhaust stroke
- ☐ beginning of exhaust stroke
- ☐ beginning of suction stroke
- ☐ end of suction stroke

8 of 100

110 PU_2015_305

The hardest material among the following:-

- ☐ sapphire
- ☐ gypsum
- ☐ apatite
- ☐ fluorite

9 of 100

108 PU_2015_305

Generally used moderator in the nuclear power plant is:-

- ☐ beryllium
- ☐ cadmium
- ☐ lead
- ☐ graphite

10 of 100

104 PU_2015_305

The bond formed by the transfer of one electron to the other is known as:-

- ☐ ionic
- ☐ metallic
- ☐ hydrogen
- ☐ covalent

11 of 100

102 PU_2015_305

In non-destructive testing, the dye penetrant test is usually carried out to check the defects.

- ☐ core
- ☐ chemical
- ☐ elemental
- ☐ surface

12 of 100

116 PU_2015_305

Which among the following notation represents the family of directions in a crystal?

- ☐ (111)
- ☐ $\langle 111 \rangle$
- ☐ [111]
- ☐ {111}

13 of 100

223 PU_2015_305

Which among the following has highest percentage of ionic character?

- ☐ MgO
- ☐ ZnS
- ☐ SiC
- ☐ NaCl

14 of 100

225 PU_2015_305

The process by which consolidation of powder into solid dense mass is known as:-

- ☐ sintering
- ☐ diffusion
- ☐ infiltration
- ☐ pressing

15 of 100

221 PU_2015_305

Which one among the following is not converted into non pollutant in a catalytic converter?

- ☐ unburnt hydrocarbon
- ☐ oxides of nitrogen
- ☐ carbon monoxide
- ☐ sulphur

16 of 100

227 PU_2015_305

A completely aligned fiber reinforced composite consist – 40 vol% fiber with modulus of elasticity 69 GPa and 60 vol% matrix with the modulus of 3.4GPa. The modulus of the composite is:-

- ☐ 15 GPa

- ☐ 60 GPa
- ☐ 30 GPa
- ☐ 45 GPa

17 of 100

266 PU_2015_305

When a material is stressed, the generation of electricity is known as:-

- ☐ piezoresistivity
- ☐ ferroelectricity
- ☐ thermoelectricity
- ☐ piezoelectricity

18 of 100

264 PU_2015_305

On increasing the temperature:-

- ☐ the resistivity of a metal and a semiconductor increases
- ☐ the resistivity of a metal and a semiconductor decreases
- ☐ the resistivity of a metal increases while for a semiconductor decreases
- ☐ the resistivity of a metal decreases while for a semiconductor increases

19 of 100

260 PU_2015_305

Identify the statement which is TRUE with respect to nanomaterials.

- ☐ For unit mass surface energy of the nanostructures are lower than the micron sized particles
- ☐ Surface energy of the nanostructures are zero
- ☐ For nanomaterials surface area to volume ratio is high
- ☐ For nanomaterials total number of atoms present on the surface is low

20 of 100

262 PU_2015_305

Permanent magnetic moment in the absence of electric field is known as:-

- ☐ ferromagnetism
- ☐ diamagnetism
- ☐ paramagnetism
- ☐ giant magneto resistance

21 of 100

137 PU_2015_305

Deuteron has only one bound state with spin parity 1^+ , isospin 0 and electric quadrupole moment 0.286 efm^2 . These data suggest that the nuclear forces are having:-

- ☐ only spin and isospin dependence
- ☐ spin dependence along with tensor components

- ☐ spin dependence but no tensor components
- ☐ Ono spin dependence and no tensor components

22 of 100

125 PU_2015_305

The Hall coefficient, R_H , of sodium depends on:-

- ☐ The charge carrier density only
- ☐ The effective charge carrier mass and carrier density
- ☐ The charge carrier density and relaxation time
- ☐ The effective charge carrier mass

23 of 100

135 PU_2015_305

The ground state wave function of deuteron is in a superposition of s and d states. Which of the following is NOT true as a consequence?

- ☐ It has a non-zero quadruple moment
- ☐ The neutron-proton potential is non-central
- ☐ The Hamiltonian does not conserve the total angular momentum
- ☐ The orbital wavefunction is not spherically symmetric

24 of 100

131 PU_2015_305

A magnetic field sensor based on the Hall Effect is to be fabricated by implanting Asintoa Si film of thickness $1\text{ }\mu\text{m}$. The specifications require a magnetic field sensitivity of 500 mV/Tesla at an excitation current of 1 mA . The implantation dose is to be adjusted such that the average carrier density, after activation, is:-

- ☐ $1.25 \times 10^{22}\text{m}^{-3}$
- ☐ $1.25 \times 10^{26}\text{m}^{-3}$
- ☐ $4.1 \times 10^{21}\text{m}^{-3}$
- ☐ $4.1 \times 10^{20}\text{m}^{-3}$

25 of 100

127 PU_2015_305

For a three-dimensional crystal having N primitive unit cells with a basis of p atoms, the number of optical branches is:-

- ☐ $3p$
- ☐ $3p - 3$
- ☐ $3N - 3p$
- ☐ 3

26 of 100

143 PU_2015_305

A cavity contains blackbody radiation in equilibrium at temperature T . The specific heat per unit volume of the photon gas in the cavity is of the form $C_V = \gamma T^3$, where γ is a constant. The cavity is expanded to twice

its original volume and then allowed to equilibrate at the same temperature T . The new internal energy per unit volume is:-

- ☐ $\gamma T^4/4$
- ☐ γT^4
- ☐ $2\gamma T^4$
- ☐ $4\gamma T^4$

27 of 100

139 PU_2015_305

Choose the CORRECT statement from the following?

- ☐ Electron does not interact through weak interaction
- ☐ Neutron interacts through electromagnetic interaction
- ☐ Neutrino interacts through weak and electromagnetic interaction
- ☐ Quark interacts through strong interaction but not through weak interaction

28 of 100

141 PU_2015_305

A proton is confined to a cubic box, whose sides have length 10^{-12} m. What is the minimum kinetic energy of the proton? The mass of proton is 1.67×10^{-27} kg and Planck's constant is 6.63×10^{-34} Js .

- ☐ 3.3×10^{-17} J
- ☐ 9.9×10^{-17} J
- ☐ 6.6×10^{-17} J
- ☐ 1.1×10^{-17} J

29 of 100

129 PU_2015_305

The excitations of a three-dimensional solid are bosonic in nature with their frequency ω and wave-number k are related by $\omega \propto k^2$ in the large wavelength limit. If the chemical potential is zero, the behaviour of the specific heat of the system at low temperature is proportional to:-

- ☐ $T^{3/2}$
- ☐ $T^{1/2}$
- ☐ T^3
- ☐ T

30 of 100

133 PU_2015_305

The pressure of a nonrelativistic free Fermi gas in three-dimensions depends, at $T = 0$, on the density of fermions n as:-

- ☐ $n^{4/3}$
- ☐ $n^{2/3}$
- ☐ $n^{5/3}$
- ☐ $n^{1/3}$

31 of 100

145 PU_2015_305

Consider a Maxwellian distribution of the velocity of the molecules of an ideal gas. Let V_{mp} and V_{rms} denote the most probable velocity and the root mean square velocity, respectively. The magnitude of the ratio V_{mp}/V_{rms} is:-

- ☐ $2/3$
- ☐ $(2/3)^{1/2}$
- ☐ 1
- ☐ $3/2$

32 of 100

147 PU_2015_305

A gas of N non-interacting particles is in thermal equilibrium at temperature T . Each particle can be in any of the possible non-degenerate states of energy 0, 2ε and 4ε . The average energy per particle of the gas, when $\beta\varepsilon \ll 1$, is:-

- ☐ ε
- ☐ 2ε
- ☐ 3ε
- ☐ $2\varepsilon/3$

33 of 100

231 PU_2015_305

Bose condensation occurs in liquid He^4 kept at ambient pressure at 2.17 K. At which temperature will Bose condensation occur in He^4 in gaseous state, the density of which is 1000 times smaller than that of liquid He^4 ? (Assume that it is a perfect Bose gas.)

- ☐ 21.7 mK
- ☐ 21.7 μK
- ☐ 2.17 μK
- ☐ 2.17 mK

34 of 100

229 PU_2015_305

Gas molecules of mass m are confined in a cylinder of radius R and height L (with $R \gg L$) kept vertically in the Earth's gravitational field. The average energy of the gas at low temperatures (such that $mgL \gg kBT$) is given by:-

- ☐ $2NkBT$
- ☐ $NkBT/2$
- ☐ $5NkBT/2$
- ☐ $3NkBT/2$

35 of 100

233 PU_2015_305

Let ΔW be the work done in a quasistatic reversible thermodynamic process. Which of the following statements about ΔW is correct?

- ☐ ΔW is always a perfect differential

- ☐ ΔW is a perfect differential if the process is adiabatic
- ☐ ΔW is a perfect differential if the process is isothermal
- ☐ ΔW cannot be a perfect differential

36 of 100

235 PU_2015_305

A system of non-interacting spin-1/2 charged particles are placed in an external magnetic field. At low temperature T , the leading behavior of the excess energy above the ground state energy, depends on T as: (c is a constant)

- ☐ $e^{-c/T}$
- ☐ cT
- ☐ cT^3
- ☐ c (is independent of T)

37 of 100

271 PU_2015_305

If the peak output voltage of a full wave rectifier is 10 V, its d.c. voltage is:-

- ☐ 3.18 V
- ☐ 6.36 V
- ☐ 10.0 V
- ☐ 7.07 V

38 of 100

269 PU_2015_305

The pressure of a nonrelativistic free Fermi gas in three-dimensions depends, at $T=0$, on the density of fermions n as:-

- ☐ $n^{4/3}$
- ☐ $n^{1/3}$
- ☐ $n^{2/3}$
- ☐ $n^{5/3}$

39 of 100

273 PU_2015_305

For the set of all Lorentz transformations with velocities along the x-axis consider the two statements given below:

P: If L is a Lorentz transformation then, L^{-1} is also a Lorentz transformation. Q: If L_1 and L_2 are Lorentz transformations then, $L_1 L_2$ is necessarily a Lorentz transformation.

Choose the correct option.

- ☐ P is true and Q is false
- ☐ P is false and Q is true
- ☐ Both P and Q are true
- ☐ Both P and Q are false

40 of 100

275 PU_2015_305

Two particles each of rest mass m collide head-on and stick together. Before collision, the speed of each mass was 0.6 times the speed of light in free space. The mass of the final entity is:-

- ☐ $2m$
- ☐ $5m/2$
- ☐ $25m/8$
- ☐ $5m/4$

41 of 100

151 PU_2015_305

Antibodies that recognize only one epitop derived from a single clone is called:-

- ☐ Bivalent antibodies
- ☐ Polyclonal antibodies
- ☐ Monoclonal antibodies
- ☐ Monovalent antibodies

42 of 100

171 PU_2015_305

Relative amount of A, T, G and C in DNA were measured first by:-

- ☐ Ramachandran
- ☐ Watson and Crick
- ☐ Erwing Chargaff
- ☐ Peterson

43 of 100

161 PU_2015_305

The enzymes used in polymerase chain reaction is:-

- ☐ Taq DNA polymerase
- ☐ Polymerase III
- ☐ DNA ligase
- ☐ RNA polymerase

44 of 100

159 PU_2015_305

Guanosine nucleotide is held by the cytosine nucleotide by the number of H-bonds:-

- ☐ 4
- ☐ 2
- ☐ 1
- ☐ 3

45 of 100

169 PU_2015_305

The first reaction involved in the carbohydrate metabolism is:-

- ☐ Formation of Acetyl Co-A
- ☐ Carboxylation
- ☐ Phosphorylation
- ☐ Hydrogenation

46 of 100

167 PU_2015_305

In the melting point curve of DNA, T_m increases with increasing:-

- ☐ A + G content
- ☐ G + C content
- ☐ A + C content
- ☐ G + T content

47 of 100

163 PU_2015_305

Suitable organism for use in recombinant vaccine is:-

- ☐ Influenza virus
- ☐ Vaccinia virus
- ☐ Small pox virus
- ☐ Poliomyelitis virus

48 of 100

153 PU_2015_305

The process of synthesis of protein from RNA is called:-

- ☐ Isolation
- ☐ Replication
- ☐ Transcription
- ☐ Translation

49 of 100

157 PU_2015_305

When the idiotopes are used as vaccine to mimic antigen, the vaccine is known as:-

- ☐ Synthetic vaccine
- ☐ Recombinant vaccine
- ☐ Subunit vaccine
- ☐ Anti-idiotypic vaccine

50 of 100

149 PU_2015_305

The technique of transfer of DNA molecules separated by gel electrophoresis to the nitrocellulose or nylon membrane is called:-

- ☐ Eastern blot
- ☐ Northern blot
- ☐ Southern blot
- ☐ Western blot

51 of 100

155 PU_2015_305

Conjugal transfer of gene takes place in Bacteria by:-

- ☐ Fimbriae
- ☐ Sexpili
- ☐ Polymerized molecule
- ☐ Flagellae

52 of 100

165 PU_2015_305

The pH of a buffer to be used for the separation of lysine and histidine in cation exchange column is:-

- ☐ 2
- ☐ 4
- ☐ 8
- ☐ 12

53 of 100

239 PU_2015_305

The lethal gene ratio is:-

- ☐ 2:1
- ☐ 4:1
- ☐ 8:1
- ☐ 1:1

54 of 100

243 PU_2015_305

α -helix is disrupted by certain aminoacids like:-

- ☐ Arginine
- ☐ Proline
- ☐ Histidine
- ☐ Lysine

55 of 100

237 PU_2015_305

The recombinant DNA based human vaccine commercially available against:-

- ☐ Leprosy
- ☐ HIV
- ☐ Tuberculosis
- ☐ Hepatitis B

56 of 100

241 PU_2015_305

The neutral aminoacid is:-

- ☐ Proline
- ☐ Histidine
- ☐ Leucine
- ☐ Serine

57 of 100

279 PU_2015_305

All t-RNA molecules have a common CCA sequence at the:-

- ☐ 5' 3' terminal
- ☐ 3' terminal
- ☐ 5' terminal
- ☐ 3'5' terminal

58 of 100

277 PU_2015_305

Keratin is synthesized from:-

- ☐ Glycine
- ☐ Proline
- ☐ Serine
- ☐ Methionine

59 of 100

281 PU_2015_305

The shape of natural DNA strands cannot be:-

- ☐ Hairpin
- ☐ Interlocked
- ☐ Circular
- ☐ Linear

60 of 100

283 PU_2015_305

The gene coding for VP1 is cloned in:-

- ☐ pUC 18
- ☐ pUC 19
- ☐ pMB 9
- ☐ pBR 322

61 of 100

177 PU_2015_305

If in a frequently distribution, the mean and median are 21 and 22 respectively, then its mode is approximately:-

- ☐ 20.5
- ☐ 22.0
- ☐ 25.5
- ☐ 24.0

62 of 100

191 PU_2015_305

The compound interest on Rs. 30,000 at 7% per annum is Rs. 4347. The period (in years) is:-

- ☐ 3
- ☐ 2
- ☐ 4
- ☐ 2.5

63 of 100

193 PU_2015_305

In the first 10 overs of a cricket game, the run rate was only 3.2. What should be the run rate in the remaining 40 overs to reach the target of 282 runs?

- ☐ 7
- ☐ 6.5
- ☐ 6.75
- ☐ 6.25

64 of 100

183 PU_2015_305

The area enclosed between the curve $y = \log_e (x + e)$ and the coordinate axes is:-

- ☐ 4
- ☐ 3
- ☐ 2
- ☐ 1

65 of 100

187 PU_2015_305

If $\cos^{-1}(1/x) = \theta$, then $\tan \theta =$

- ☐ $\sqrt{(x^2 - 1)}$
- ☐ $\sqrt{(1 - x^2)}$
- ☐ $\sqrt{(x^2 + 1)}$
- ☐ $1/\sqrt{(x^2 - 1)}$

66 of 100

173 PU_2015_305

A school committee consists of 2 teachers and 4 students. The number of different committees that can be formed from 5 teachers and 10 students is:-

- ☐ 10
- ☐ 15
- ☐ 2100
- ☐ 8

67 of 100

195 PU_2015_305

The number of real roots of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ are:-

- ☐ 3
- ☐ 1
- ☐ Infinite
- ☐ None

68 of 100

175 PU_2015_305

The period of $2 \sin x \cos x$ is:-

- ☐ 4π
- ☐ $4\pi^2$
- ☐ 2π
- ☐ π

69 of 100

189 PU_2015_305

In a single throw of two dice, the probability of getting more than 7 is:-

- ☐ $5/36$
- ☐ $7/12$
- ☐ $7/36$
- ☐ $5/12$

70 of 100

185 PU_2015_305

Square of either of the two imaginary cube roots of unity will be:-

- ☐ Real root of unity
- ☐ Other imaginary cube root of unity
- ☐ Sum of two imaginary roots of unity
- ☐ None of these

71 of 100

179 PU_2015_305

If in a triangle ABC, the altitudes from the vertices A, B, C on opposite sides are in H.P., then $\sin A$, $\sin B$, $\sin C$ are in:-

- ☐ H.P.
- ☐ Arithmetic – Geometric Progression
- ☐ A.P.
- ☐ G.P.

72 of 100

181 PU_2015_305

The number of values of x in the interval $[0, 3\pi]$ satisfying the equation $2\sin 2x + 5\sin x - 3 = 0$ is:-

- ☐ 6
- ☐ 2
- ☐ 1
- ☐ 4

73 of 100

248 PU_2015_305

The expression $(2 + \sqrt{2})^4$ has value, lying between.

- ☐ 134 and 135
- ☐ 135 and 136
- ☐ 136 and 137
- ☐ None of these

74 of 100

250 PU_2015_305

The sum of 3 numbers in geometric progression is 38 and their product is 1728. The middle number is.

- ☐ 12
- ☐ 8
- ☐ 6
- ☐ 18

75 of 100

246 PU_2015_305

Two circles have equations $x^2 + y^2 = 16$ and $(x - 2)^2 + y^2 = 4$. Which of the following correctly describes the relative position of the two circles.

- ☐ The two circles touch externally
- ☐ The two circles touch internally
- ☐ The circles do not touch or intersect
- ☐ The two circles intersect

76 of 100

244 PU_2015_305

The degree and order of the differential equation of the family of all parabolas whose axis is x-axis, are respectively:-

- ☐ 2, 1
- ☐ 1, 2
- ☐ 2, 3
- ☐ 3, 2

77 of 100

287 PU_2015_305

The ends of latus rectum of parabola $x^2 + 8y = 0$ are:-

- ☐ (-4, -2) and (4, -2)
- ☐ (4, 2) and (-4, 2)
- ☐ (4, -2) and (-4, 2)
- ☐ (-4, -2) and (4, 2)

78 of 100

289 PU_2015_305

The points (0, 8/3), (1, 3) and (82, 30) are the vertices of:-

- ☐ A right angled triangle
- ☐ A right angled triangle
- ☐ An equilateral triangle
- ☐ None of these

79 of 100

285 PU_2015_305

Which vector is perpendicular to the plane containing the three points P(2, 1, 5), Q(-1, 3, 4), and R(3, 0, 6)?

- ☐ $2i + 2j - k$
- ☐ $2i - j + k$
- ☐ $i + 2j + 2k$
- ☐ $i + 2j + k$

80 of 100

291 PU_2015_305

If $^{12}\text{P}_r$, then r is equal to:-

- ☐ 3
- ☐ 2
- ☐ 4
- ☐ 5

81 of 100

218 PU_2015_305

The condensation polymer among the following is:-

- ☐ Protein
- ☐ PVC
- ☐ Polythene
- ☐ Rubber

82 of 100

214 PU_2015_305

The laws of electrolysis were proposed by:-

- ☐ Fritz Haber
- ☐ Friedrich Kohlrausch
- ☐ Michael Faraday
- ☐ Richard Abegg

83 of 100

216 PU_2015_305

Which of the following electrolytic solutions has the least specific conductance?

- ☐ 0.02N
- ☐ 0.2N
- ☐ 0.002N
- ☐ 2N

84 of 100

210 PU_2015_305

What is the electrochemical equivalent (in g coulomb⁻¹) of silver? (Ag = 108; F = Faraday)

- ☐ 108 F
- ☐ 1/108 F
- ☐ F/108
- ☐ 108/F

85 of 100

202 PU_2015_305

During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud' These are:-

- ☐ Sn and Ag
- ☐ Ag and Au
- ☐ Fe and Ni
- ☐ Pb and Zn

86 of 100

208 PU_2015_305

Amongst the following the most basic compound is:-

- ☐ acetanilide
- ☐ p-nitroaniline
- ☐ aniline
- ☐ benzylamine

87 of 100

212 PU_2015_305

The best way to prevent rusting of iron is:-

- ☐ putting it in an acidic solution
- ☐ making iron cathode
- ☐ both (A) and (B)
- ☐ neither (A) nor (B)

88 of 100

204 PU_2015_305

The number and type of bonds between two carbon atoms in calcium carbide are:-

- ☐ One sigma, one pi
- ☐ Two sigma, one pi
- ☐ One sigma, two pi
- ☐ Two sigma, two pi

89 of 100

196 PU_2015_305

The number of d-electrons in Fe^{2+} ($Z = 26$) is not equal to that of:-

- ☐ d-electrons in Fe ($Z=26$)
- ☐ p-electrons in Ne ($Z=10$)
- ☐ s-electrons in Mg ($Z=12$)
- ☐ p-electrons in Cl ($Z=17$)

90 of 100

206 PU_2015_305

Which of the following is fully fluorinated polymer?

- ☐ PVC
- ☐ Teflon

- ☐ Neoprene
- ☐ Thiokol

91 of 100

200 PU_2015_305

Which one of the following pairs of species have the same bond order?

- ☐ O^- and CN^-
- ☐ CN^- and NO^+
- ☐ NO^+ and CN^+
- ☐ CN^- and CN^+

92 of 100

198 PU_2015_305

The number of moles of solute present in 1 kg of a solvent is called its:-

- ☐ Molarity
- ☐ Normality
- ☐ Molality
- ☐ Formality

93 of 100

256 PU_2015_305

$(NH_4)_2Cr_2O_7$ On heating gives a gas which is also given by:-

- ☐ heating NH_4NO_2
- ☐ $Mg_3N_2 + H_2O$
- ☐ Na (comp.) + H_2O_2
- ☐ heating NH_4NO_3

94 of 100

258 PU_2015_305

Which one of the following does not involve coagulation?

- ☐ Peptization
- ☐ Clotting of blood by the use of ferric chloride
- ☐ Formation of delta regions
- ☐ Treatment of drinking water by potash alum

95 of 100

252 PU_2015_305

Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

- ☐ Metal sulphides are less stable than the corresponding oxides
- ☐ CO_2 is thermodynamically more stable than CS_2
- ☐ Metal sulphides are thermodynamically more stable than CS_2

- ☐ CO_2 is more volatile than CS_2

96 of 100

254 PU_2015_305

The potential of a hydrogen electrode at pH = 10 is:-

- ☐ -0.59V
☐ 0.059V
☐ 0.00V
☐ 0.59V

97 of 100

292 PU_2015_305

Phenol, when it first reacts with concentrated sulphuric acid and then with concentrated nitric acid, gives:-

- ☐ p-nitrophenol
☐ nitrobenzene
☐ o-nitrophenol
☐ 2,4,6-trinitrobenzene

98 of 100

296 PU_2015_305

Which of the following arrangements does not represent the correct order of the property stated against it?

- ☐ $\text{Co}^{3+} < \text{Fe}^{3+} < \text{Cr}^{3+} < \text{Sc}^{3+}$: stability in aqueous solution
☐ $\text{Sc} < \text{Ti} < \text{Cr} < \text{Mn}$: number of oxidation states
☐ $\text{V}^{2+} < \text{Cr}^{2+} < \text{Mn}^{2+} < \text{Fe}^{2+}$: paramagnetic behavior
☐ $\text{Ni}^{2+} < \text{Co}^{2+} < \text{Fe}^{2+} < \text{Mn}^{2+}$: ionic size

99 of 100

298 PU_2015_305

Based on the first law of thermodynamics, which one of the following is correct?

- ☐ For an isochoric process, $\Delta U = \Delta q$
☐ For an adiabatic process, $\Delta U = \Delta w$
☐ For a cyclic process, $q = \Delta w$
☐ For an isothermal process, $q = +w$

100 of 100

294 PU_2015_305

Reaction of one molecule of HBr with one molecule of 1,3-butadiene at 40°C gives predominantly.

- ☐ 3-bromobutene under kinetically controlled conditions
☐ 1-bromo-2-butene under thermodynamically controlled conditions
☐ 1-bromo-2-butene under kinetically controlled conditions
☐ 3-bromobutene under thermodynamically controlled conditions