

1.

Consider a dimensionally consistent equation given as :

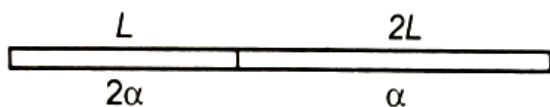
$$P = ab + \frac{cd}{e+f}$$

Select the correct alternative.

1.  $[ab] = [cd]$
2.  $[a] = \left[\frac{cd}{be}\right]$
3.  $[Pab] = \left[\frac{cd}{e+f}\right]$
4.  $[b] = [P][e+f]$

2.

Two uniform rods of length  $L$  and  $2L$  and thermal coefficient of linear expansion  $2\alpha$  and  $\alpha$  respectively, are connected as shown in the figure. The equivalent coefficient of linear expansion is



1.  $\frac{3\alpha}{4}$
2.  $\frac{4\alpha}{3}$
3.  $\frac{2\alpha}{3}$
4.  $\frac{5\alpha}{3}$

3.

The phase difference between velocity and displacement in a simple harmonic motion is

1.  $\pi$
2.  $\frac{\pi}{2}$
3.  $\frac{\pi}{4}$
4. Zero

4.

A particle executes SHM with a time period of 4s. The time taken by the particle to go directly from its mean position to half of its amplitude is:

1.  $\frac{1}{3}$  s
2. 1 s
3.  $\frac{1}{2}$  s
4. 2 s

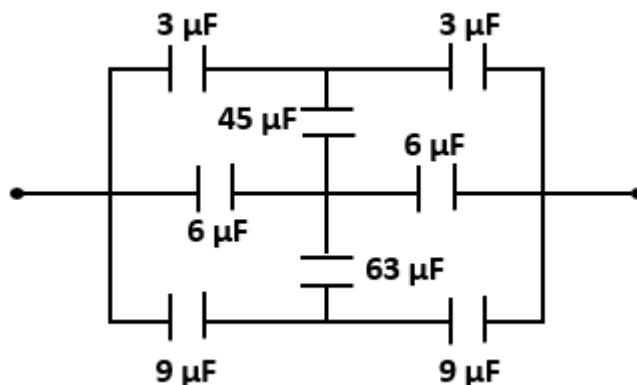
5.

A solid conducting sphere of radius 1 cm having charge 2 mC is surrounded by a conducting spherical shell of inner radius 2 cm and outer radius 3 cm having total charge -2 mC. Both spheres are connected with conducting wire. Surface charge density on the outer surface of the shell is

1.  $\frac{-10^{-3}}{9\pi}$
2.  $-\frac{9}{\pi} \times 10^{-3}$
3.  $-\frac{5 \times 10^{-3}}{\pi}$
4. zero

6.

Equivalent capacitance of following arrangement



1.  $18 \mu F$
2.  $9 \mu F$
3.  $6 \mu F$
4.  $12 \mu F$

7.

The magnetic field at the center of circular coil is  $B_0$ . Then the distance on its axis where  $B_x = \frac{B_0}{8}$  is ( $R$  = radius of coil) :

1.  $\frac{R}{3}$
2.  $\sqrt{3}R$
3.  $\frac{R}{\sqrt{3}}$
4.  $\frac{R}{2}$

8.

An electron is revolving around a nucleus (atomic number  $Z$ ) with angular velocity  $\omega$ . If radius of the orbit is  $r$  then magnetic moment of the electron is equal to :

1.  $e \omega r^2$
2.  $\frac{1}{2} e \omega r^2$
3.  $Ze \omega r^2$
4.  $\frac{1}{2} Ze \omega r^2$

9.

A 2 kg particle moves along X-axis such that its position ( $x$ ) varies with time ( $t$ ) as  $x = 2t^2 + 3$ . During the initial 5 seconds, the work done by all the forces acting on the particle is:

1. 400 J
2. 500 J
3. 600
4. 900J

10.

Two blocks A and B of mass  $m$  and  $4m$  at rest are displaced through identical paths due to identical net forces, then

1. Their speeds are in the ratio,  $\frac{v_A}{v_B} = \frac{1}{1}$
2. Work done on the blocks is in the ratio,  $\frac{W_A}{W_B} = \frac{1}{1}$
3. Their kinetic energies are in the ratio,  $\frac{k_A}{k_B} = \frac{1}{4}$
4. All of these

11.

Two wires A and B of a musical instrument 'Sitar' produce 3 beats per second. If the tension of B is raised, the number of beats becomes 1 beat per second. If the frequency of A is 450 Hz, then original frequency of B is

1. 447 Hz
2. 453 Hz
3. 449 Hz
4. 451 Hz

12.

The fundamental frequency of an open organ pipe is 200 Hz. When half-length of the pipe is immersed in water, the fundamental frequency of the air column in the pipe will be

1. 100 Hz
2. 200 Hz
3. 400 Hz
4. 800 Hz

13.

If the energy of the electron in an H-atom in the ground state is taken to be -13.6 eV, then the kinetic energy of the electron in the first excited state will be

1. 3.4 eV
2. 6.8 eV
3. 10.2 eV
4. 13.6 eV

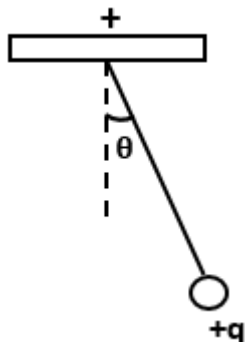
14.

A freshly prepared radio-isotope has activity 64 times the allowed level. If half-life is 3 h, then how long one must wait before using the isotope in radio-diagnosis?

1. 24 h
2. 18 h
3. 12 h
4. 6 h

15.

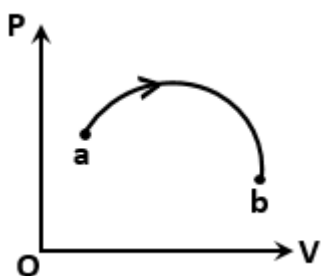
A pendulum oscillates with the time period  $T$ . The string, used in the pendulum, is stretchable. The point to which it is attached is given a positive charge and the bob is also given positive charge  $q$ . The time period of the pendulum will



1. Increase
2. Decrease
3. Remain the same
4. May increase or decrease

16.

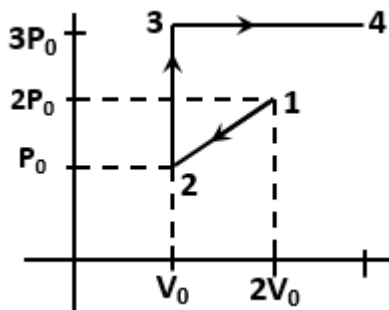
How does the temperature change when the state of an ideal gas is changed according to the process shown in the figure?



1. Temperature increases continuously
2. Temperature decreases continuously
3. Temperature first increases and then decreases
4. Temperature first decreases and then increases

17.

The PV diagram of an ideal gas is shown in the figure. Work done by the gas in the process  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$  will be



1.  $\frac{9 P_0 V_0}{2}$
2.  $\frac{15}{2} P_0 V_0$
3.  $\frac{13 P_0 V_0}{2}$
4.  $\frac{3 P_0 V_0}{2}$

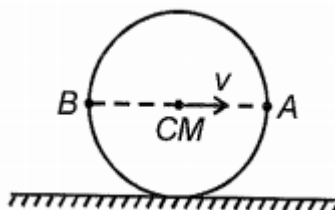
18.

A body is thrown vertically upward with initial speed  $\sqrt{gR}$ , where  $R$  is the radius of the earth. Then maximum height reached by the body from the surface of the earth is

1.  $\frac{R}{2}$
2.  $\frac{3R}{2}$
3.  $R$
4.  $\frac{R}{4}$

19.

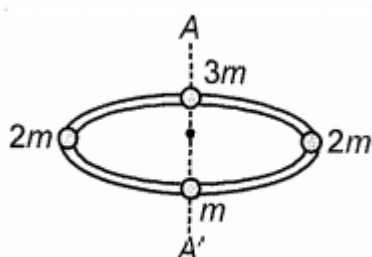
A solid sphere is rolling without slipping such that velocity of its centre of mass is  $v$ . Ratio of speed of points A & B at horizontal extremes is-



1. 1 : 1
2.  $\sqrt{2} : 1$
3. 2 : 1
4.  $1 : \sqrt{2}$

20.

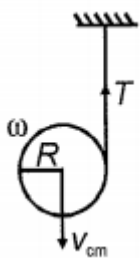
Four masses are joined to light circular frames in the figure. The radius of gyration of this system about an axis passing through the center of the circular frame and perpendicular to its plane would be (where 'a' is the radius of the circle)



1.  $\frac{a}{\sqrt{2}}$
2.  $\frac{a}{2}$
3. a
4. 2a

21.

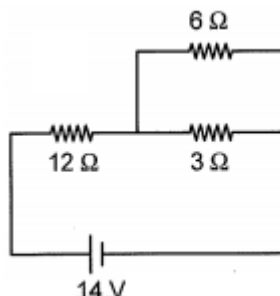
A disc of mass  $M$  and radius  $R$  starts falling down as shown in the figure. The string unwinds without slipping on the disc. The instantaneous power developed by the tension is



1.  $T \times R\omega$
2.  $\frac{T \times R\omega}{2}$
3.  $2T \times R\omega$
4. Zero

22.

Power consumed in the given circuit is  $P_1$ . On interchanging the position of  $3\ \Omega$  and  $12\ \Omega$  resistances, the new power consumption is  $P_2$ . The ratio of  $\frac{P_2}{P_1}$  is



1. 2
2.  $\frac{1}{2}$
3.  $\frac{3}{5}$
4.  $\frac{2}{5}$

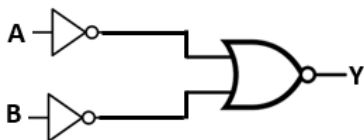
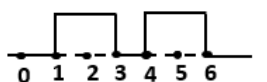
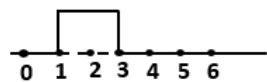
23.

Potentiometer wire is replaced by the another wire of same material and same length but half the radius. For a given potential difference, sensitivity of the potentiometer

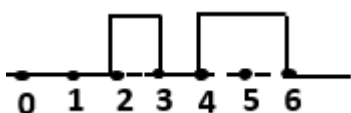
1. Decreases
2. Increases
3. Remains same
4. May increase or decrease

24.

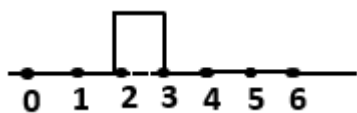
A and B are the inputs for the given logic gate. The output Y will be



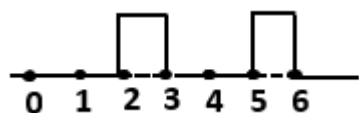
1.



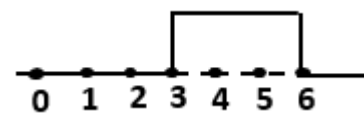
2.



3.

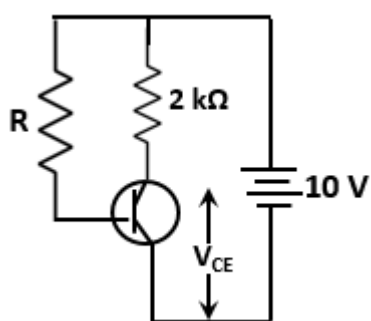


4.



25.

In the circuit given below, if  $V_{CE}$  is 5 V and  $R = 4 \times 10^5 \Omega$ , then current gain is (Neglect  $V_{BE}$ )



1. 97

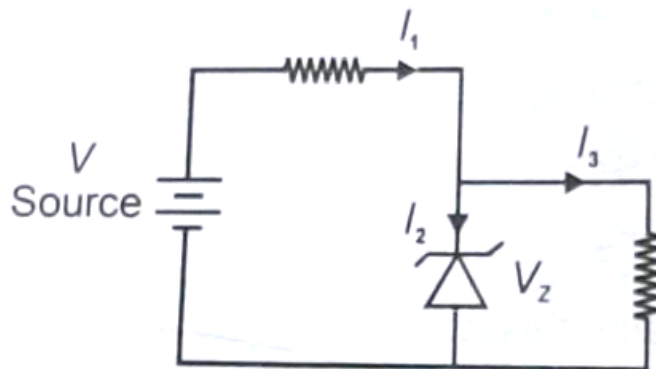
2. 98

3. 99

4. 100

26.

A zener diode is shown in the following circuit diagram. When the source voltage fluctuates such that  $V > V_z$ , then



1. All the current  $I_1, I_2$  and  $I_3$  change

2. Only  $I_1, I_2$  change and  $I_3$  remains constant

3. Only  $I_1, I_3$  change and  $I_2$  remains constant

4. All the currents remain constant

27.

A concave lens forms the image of an object such that the distance between the object and image is 10 cm. If magnification of the image is  $\frac{1}{4}$ , the focal length of the lens is

1.  $-\frac{20}{3}$  cm

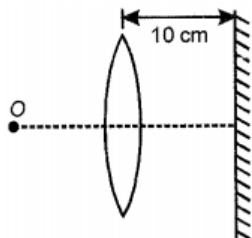
2.  $\frac{20}{3}$  cm

3.  $\frac{40}{9}$  cm

4.  $-\frac{40}{9}$  cm

28.

A point object O is placed at distance 20 cm from a biconvex lens of radius of curvature 20 cm and  $\mu = 1.5$ . The final image produced by lens and mirror combination will be at



1. 10 cm from mirror
2. 20 cm from lens
3. -20 cm from lens
4. -15 cm from mirror

29.

A boy falls freely from a building of height 320 m. After 5 second superman jumps downward with initial speed  $u$  such that the boy can be saved. The minimum value of  $u$  is (assume  $g=10 \text{ m/s}^2$ )

1. 95.1 m/s
2. 98.3 m/s
3. 91.6 m/s
4. 85.6 m/s

30.

A uniform wire of length 3m and mass 10 kg is suspended vertically from one end and loaded at another end by a block of mass 10 kg. The radius of the cross-section of the wire is 0.1 m. The stress in the middle of the wire is: ( $g = 10 \text{ ms}^{-2}$ )

1.  $1.4 \times 10^4 \text{ N/m}^2$
2.  $4.8 \times 10^3 \text{ N/m}^2$
3.  $96 \times 10^4 \text{ N/m}^2$
4.  $3.5 \times 10^3 \text{ N/m}^2$

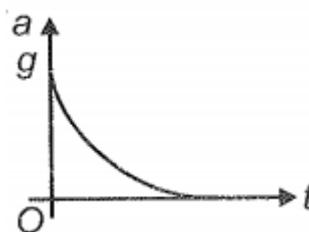
31.

The surface tension of the soap solution is  $2 \times 10^{-2} \text{ N/m}$ . If a soap bubble of radii 4 cm is blown, then the amount of work done is

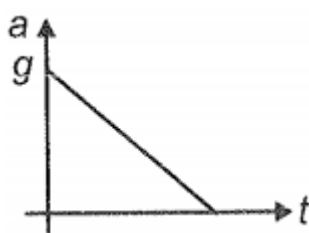
1.  $4\pi \times 10^{-6} \text{ J}$
2.  $2.56\pi \times 10^{-4} \text{ J}$
3.  $16\pi \times 10^{-5} \text{ J}$
4.  $16\pi \times 10^{-6} \text{ J}$

32.

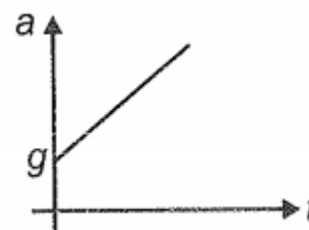
A raindrop started falling in static air. Which of the following represents its acceleration 'a' versus time 't' graph?



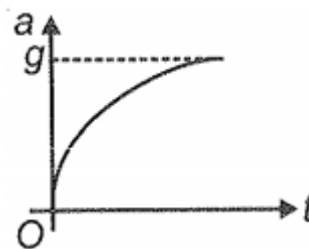
1.



2.



3.



4.



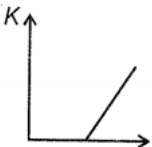
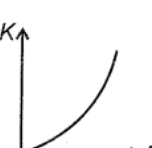
33.

Work function of a metal surface is 2 eV. When light of frequency  $\nu$  is incident on the surface, maximum kinetic energy of photoelectron emitted is 5 eV. If the frequency of the incident light is increased of  $4\nu$ , then the maximum kinetic energy of photoelectron emitted will be

1. 20 eV
2. 22 eV
3. 26 eV
4. 28 eV

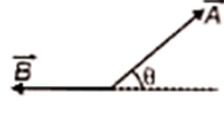
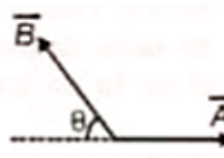
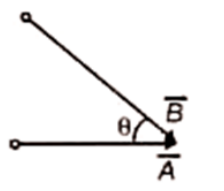
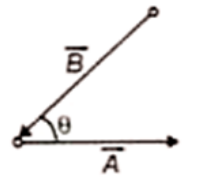
34.

The variation of kinetic energy ( $K$ ) of photoelectron as a function of frequency  $f$  of the incident radiation is best shown by-

1. 
2. 
3. 
4. 

35.

Let  $\theta$  be the angle between vectors  $\vec{A}$  and  $\vec{B}$ . Which of the following figures correctly represents the angle  $\theta$ ?

1. 
2. 
3. 
4. 

36.

A car with a vertical windshield moves in a rain storm at a speed of 40 km/hr. The rain drops fall vertically with constant speed of 20 m/s. The angle at which raindrops strike the windshield is

1.  $\tan^{-1} \frac{5}{9}$
2.  $\tan^{-1} \frac{9}{5}$
3.  $\tan^{-1} \frac{3}{2}$
4.  $\tan^{-1} \frac{2}{3}$

37.

A string tied on a roof bears a maximum tension of 50 kg-wt. The minimum acceleration that can be acquired by a man of 98 kg to descend will be [Take  $g=9.8 \text{ m/s}^2$ ]

1.  $9.8 \text{ m/s}^2$
2.  $4.9 \text{ m/s}^2$
3.  $4.8 \text{ m/s}^2$
4.  $5 \text{ m/s}^2$

38.

A balloon has 2 g of air. A small hole is pierced into it. The air comes out with a velocity of 4 m/s. If the balloon shrinks completely in 2.5 s, the average force acting on the balloon is

1. 0.008 N
2. 0.0032 N
3. 8 N
4. 3.2 N

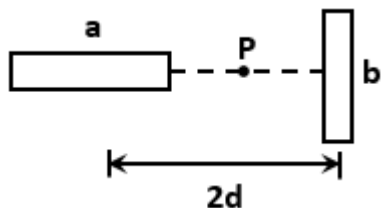
39.

Two closed containers of equal volume are filled with air at pressure  $P_0$  and temperature  $T_0$ . Both are connected by a narrow tube. If one of the container is maintained at temperature  $T_0$  and other at temperature  $T$ , then new pressure in the container will be

1.  $\frac{2P_0T}{T+T_0}$
2.  $\frac{P_0T}{T+T_0}$
3.  $\frac{P_0T}{2(T+T_0)}$
4.  $\frac{T+T_0}{P_0}$

40.

Figure shows two small identical magnetic dipoles a and b of magnetic moments  $M$  each, placed at a separation  $2d$ , with their axes perpendicular to each other. The magnetic field at the point P midway between the dipoles is-



1.  $\frac{2\mu_0 M}{4\pi d^3}$
2.  $\frac{\mu_0 M}{4\pi d^3}$
3. Zero
4.  $\frac{\sqrt{5}\mu_0 M}{4\pi d^3}$

41.

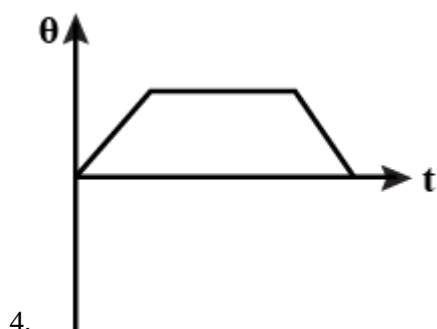
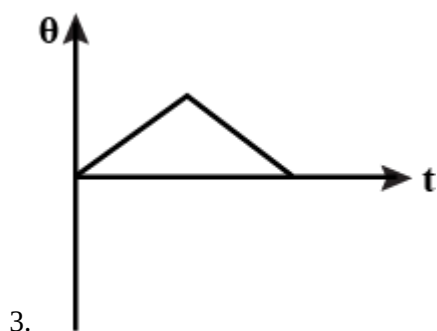
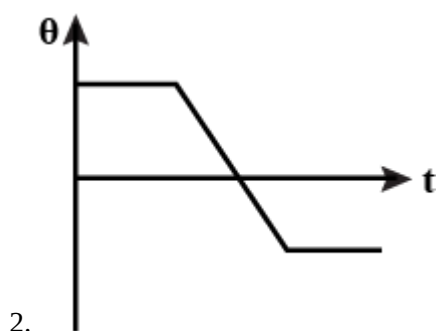
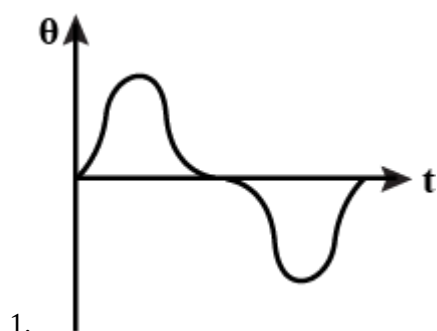
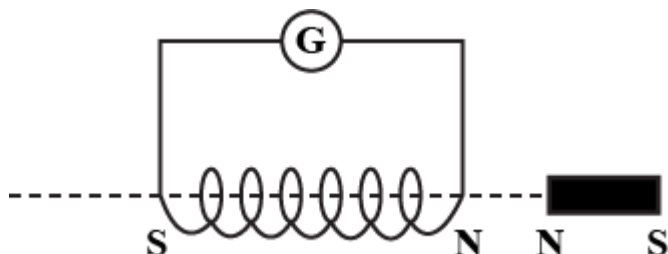
Flux  $\phi$  (in weber) in a closed circuit of resistance 10 ohm varies with time  $t$  (in seconds) according to the equation  $\phi = 6t^2 - 5t + 1$ . What is the magnitude of the induced current at  $t=0.25$  s?

1. 1.2 A
2. 0.2 A
3. 0.6 A
4. 0.8 A



42.

A short bar magnet passes at a steady speed right through a long solenoid. A galvanometer is connected across the solenoid. Which graph best represents the variation of the galvanometer deflection  $\theta$  with time  $t$ ?



43.

The peak value of an alternating e.m.f.  $E = E_0 \sin \omega t$  is 10 volt and its frequency is 50 Hz. At a time  $t = \frac{1}{600\text{s}}$ , the instantaneous value of the e.m.f. is

1. 1 volt
2.  $5\sqrt{3}$  volt
3. 5 volt
4. 10 volt

44.

If an electromagnetic wave propagating through vacuum is described by  $E_y = E_0 \sin (kx - \omega t)$ ;  $B_z = B_0 \sin (kx - \omega t)$ , then

1.  $E_0 k = B_0 \omega$
2.  $E_0 B_0 = \omega k$
3.  $E_0 \omega = B_0 k$
4.  $E_0 B_0 = \frac{\omega}{k}$

45.

In YDSE, what should be the width of each slit to obtain 20 maxima of the double-slit pattern within the central maximum of the single slit pattern? ( $d = 1 \text{ mm}$ )

1. 0.01 mm
2. 1.0 mm
3. 0.1 mm
4. 0.001 mm

46.

Which of the following is the largest constituent of the membrane of the erythrocyte in human beings and is also responsible for performing most of the functions of the membrane?

1. Proteins
2. Lipids
3. Glycolipids
4. Glycoproteins

47.

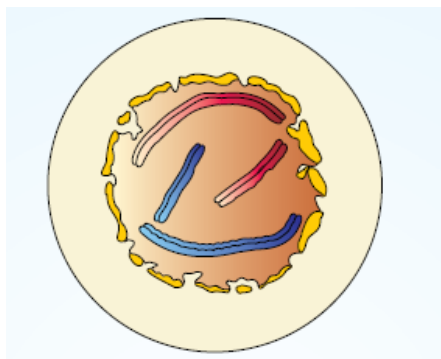
Ovary is one-chambered but becomes two-chambered due to the formation of the false septum in:

1. *Argemone*
2. *Salvia*
3. *Cassia*
4. *Primrose*

48. The ATPase activity of the myosin head is dependent on:
1. Magnesium ions
  2. Manganese ions
  3. Calcium ions
  4. Ferric ions
49. Which of the following is entirely made of cartilage?
1. Nasal septum
  2. Larynx
  3. Glottis
  4. Trachea
50. For each ATP produced, how many H<sup>+</sup> passes through  $F_0$  from the intermembrane space to the matrix down the electrochemical proton gradient?
1. 1
  2. 2
  3. 3
  4. 4
51. The formation of interfascicular cambium in plants is due to:-
1. Non-differentiation
  2. Re-differentiation
  3. Differentiation
  4. De-differentiation
52. Normal activities of the human heart are regulated:
1. Intrinsically
  2. By the autonomic nervous system
  3. By the brain stem
  4. By the diencephalon
53. Consider the following sets of some animals. The set that consists of all animals belonging to the same phylum is:
1. *Pinctada*, *Aplysia*, *Chaetopleura*
  2. *Dentallium*, *Pila*, *Echinus*
  3. *Asterias*, *Antedon*, *Ascidia*
  4. *Adamsia*, *Gorgonia*, *Pleurobrachia*
54. The life cycle is not haplo-diplontic in:
1. Bryophytes
  2. Pteridophytes
  3. *Polysiphonia*
  4. *Fucus*
55. If the DNA content of an onion tip cell is 2C at the end of the M-phase, what would be its DNA content at the end of the S-phase?
1. C
  2. 2C
  3. 3C
  4. 4C
56. Identify the incorrect statement:
1. In males FSH regulates spermatogenesis
  2. Thyroid gland produces T<sub>3</sub> and thyroxine (T<sub>4</sub>) hormones
  3. ACTH stimulates secretion of glucocorticoids
  4. PTH is a hyperglycemic hormone
57. Hormones that act by interacting with intracellular include all the following except:
1. Thyroxin
  2. Estrogen
  3. Epinephrine
  4. Cortisol
58. Dense irregular connective tissue is present in:
1. Tendons
  2. Ligaments
  3. Skin
  4. Cartilage

59.

The cell shown in the given diagram is in:



1. Early prophase
2. Late prophase
3. Metaphase
4. Telophase

60.

Consider the following two statements:

I. Except for plants in shade or in dense forests, light is rarely a limiting factor in nature for photosynthesis.

II. Light saturation occurs at 50% of the full sunlight.

1. Both statements are correct and II explains I
2. Both statements are incorrect
3. I is correct and II is incorrect
4. I is incorrect and II is correct

61.

The condition where urea accumulates in blood is:

1. Glycosuria
2. Uremia
3. Ketonuria
4. Acidosis

62.

The amino acid derivative among the following hormone is:-

1. Insulin
2. Epinephrine
3. Estradiol
4. Testosterone

63.

The developing oocyte divides and releases the first polar body in :

1. Primary follicle
2. Secondary follicle
3. Tertiary follicle
4. Graffian follicle

64.

Darwin believed that certain parts of the body get larger and more complex through the generations because they :

1. are used more extensively than other parts
2. contribute to greater reproductive success
3. are pre-determined to do so
4. are most similar to God's perfection

65.

Which of the following is not an arthropod characteristic?

1. Jointed appendages
2. Non-segmented bodies
3. Periodic moulting
4. Articulated exoskeleton

66.

Consider the following statements :

I. Many bony fishes, aquatic amphibians, and aquatic insects are ammonotelic

II. Mammals, many terrestrial amphibians, and cartilaginous fishes are ureotelic

III. Reptiles, birds, land snails, and insects are uricotelic

Which of the above statements are true?

1. I and II only
2. I and III only
3. II and III only
4. I, II and III

67.

Consider the following statements:

- I. In an aquatic ecosystem, GFC is the major conduit for energy flow.
- II. In a terrestrial ecosystem, DFC is the major conduit for energy flow.
- III. GFC and DFC are not interconnected at any level.

Which of the above statements are true?

1. I and II only
2. I and III only
3. II and III only
4. I, II, and III

68.

In cochlea, the auditory receptors are:

1. Organ of Corti
2. Ampulla
3. Macula
4. Hair cells

69.

Somaclones are produced by

1. Micropropagation.
2. Mutation.
3. Polyploidy.
4. Hybridisation.

70.

Nucellar polyembryony is reported in species of

1. Brassica
2. Citrus
3. Gossypium
4. Triticum

71.

What is the  $F_2$  phenotypic ratio in cases of incomplete dominance?

1. 1 : 1
2. 3 : 1
3. 1 : 2 : 1
4. 1 : 1

72.

The backbone of a polynucleotide chain is made of:

1. Sugar and nitrogenous bases
2. Phosphate and nitrogenous bases
3. Sugar and phosphate
4. Sugar, phosphate, and nitrogenous bases

73.

Histones are:

1. Positively charged and basic amino acids
2. Negatively charged and basic proteins
3. Positively charged and acidic proteins
4. Not found in bacteria

74.

Which of the following statements is/are correct?

- (1) The entire sequence of communities that successively change in a given area is called sere.
- (2) The natural reservoir of phosphorus is rock.
- (3) Ecological pyramids do not accommodate food web.

1. Only statement (1) is correct.
2. Only statement (2) is correct.
3. All (1), (2) and (3) are correct.
4. All (1), (2) and (3) are incorrect.

75.

The salient features of the human genome include all except:

1. About 1.4 million SNP locations
2. Functions known for less than 50% of the discovered genes
3. The actual number of genes and the initial estimates are remarkable similar
4. More than 98% of genome does not code for proteins

76.

Which of the following is removed during maturation of insulin?

1. A chain
2. B chain
3. C chain
4. Disulphide bond

77.

Which of the following is not correct with respect of control of vehicular air pollution in India?

1. Use of CNG as fuel
2. Not phasing out of old vehicles as they have better technology
3. Use of unleaded petrol, low-sulphur petrol and diesel
4. Use of catalytic converter

78.

Select the option which is incorrect for enzyme catalase.

1. The cofactor present is inorganic and proteinaceous in nature
2. Haem is the prosthetic group required by the enzyme
3. The cofactor required for optimal activity must be tightly bound to the apoenzyme
4. It catalyses breakdown of hydrogen peroxide to water and oxygen

79.

Select the correct statement

1. Cells in a malignant tumor do not show contact inhibition
2. Computed tomography scans use non-ionising radiations to study cancer of internal organs.
3. AIDS is a retroviral disease caused by unenveloped HIV.
4. Treatment of AIDS with antiretroviral drugs is completely effective and always prevents death.

80.

Hypodermis in dicot stem is composed of

1. Parenchyma
2. Collenchyma
3. Sclerenchyma
4. Both 1. and 3.

81.

Which is not an effect of global warming

1. more extreme weather condition
2. melting of polar ice caps
3. Rise of sea level
4. Good fungal growth in soil

82.

“When we conserve and protect the whole ecosystem, its biodiversity at all levels is protected.” This approach includes all of the following, except

1. Seed bank
2. Biosphere reserves
3. National parks
4. Sanctuaries

83.

In nature, a given habitat has enough resources to support a maximum possible number, beyond which no further growth is possible. The limit is known as

1. Environmental resistance
2. Intrinsic rate of natural increase
3. Carrying capacity
4. Exponentially growth

84.

In xylem continuous chain of water is re-established, when it is broken, by

1. Guttation
2. Root pressure
3. Imbibition
4. Transpiration

85.

To protect and improve the quality of our environment, government of India has passed Environment (Protection) Act in the year \_\_\_\_\_

1. 1974
2. 1981
3. 1986
4. 1987

86.

Mark the incorrect match regarding the process involved in digestion and absorption?

- |                                                                    |   |                                                        |
|--------------------------------------------------------------------|---|--------------------------------------------------------|
| 1. Muscular activities of different parts of the alimentary canal. | → | Hormonal control.                                      |
| 2. Absorption and transport of water.                              | → | Passive process and depends upon the osmotic gradient. |
| 3. Absorption of fatty acid.                                       | → | Involvement of micelle.                                |
| 4. Large intestine.                                                | → | Absorption of some water, minerals and certain drugs.  |

87.

Which one of the following statements is correct for secondary succession?

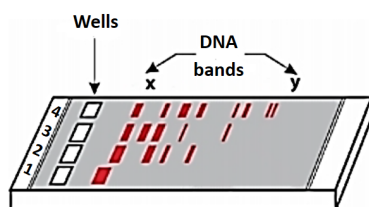
1. It begins on a bare rock
2. It occurs on a deforested site
3. It follows primary succession
4. It is similar to primary succession except that it has a relatively fast pace

88.

Meiosis occurs in

1. Megaspore
2. Meiocyte
3. Conidia
4. Gemmule

89.



In the above diagram showing a typical agarose gel electrophoresis

1. Lane 1 shows undigested DNA fragment
2. Lane 4 shows largest DNA particles towards 'y'
3. The procedure helps to form clones of DNA
4. The procedure takes place as the DNA fragments are double stranded

90.

Anal cerci are paired, jointed outgrowth found in cockroach. These arise from

1. 9<sup>th</sup> sternum
2. 10<sup>th</sup> tergum
3. 9<sup>th</sup> tergum
4. 8<sup>th</sup> tergum

91.

The technique of replacing a defective mutant allele with a functional one in an individual's cells to treat hereditary diseases is known as

1. Molecular diagnostics
2. Genetic modification
3. Gene therapy
4. Gene cloning

92.

Select incorrect statements w.r.t. living beings

- 1 Growth cannot be taken as a defining property of living organisms
- 2 Growth can be easily observed in vitro culture
- 3 Metabolic reactions cannot be demonstrated outside the body in cell-free system
- 4 All organisms, from the prokaryotes to the most complex eukaryotes can sense and respond to environmental cues

93.

Mark the incorrect statement (w.r.t. gymnosperms)

- 1 Sequoia is one of the tallest tree species
- 2 Dimorphic roots, stem and leaves in pinus
- 3 Generally tap roots are present
- 4 Palmately compound leaves in Cycas

94.

The symptoms that appear due to manganese toxicity may actually be the deficiency symptoms of

1. Iron, boron, and zinc
2. Iron, magnesium, and calcium
3. Molybdenum, magnesium, and copper
4. Calcium, magnesium, and potassium

95.

Which of the following factor has not aided in high species diversity of tropics?

1. Less seasonal variation promoting niche generalization
2. Availability of more solar energy
3. Pest pressure
4. Less migration

96.

Mark the **correct** statement:

- 1 The stage between two successive meiotic division is generally long lived
- 2 In plant cells, wall formation starts in the centre of the cell and grows outward to meet the existing lateral walls
- 3 Meiosis results in conservation of specific chromosomes number of each species across generations in asexually reproducing organisms
- 4 Telophase - I can last for months or year

97.

A set of characters for desert adaptation are

1. Respiratory roots, salt secreting glands,  $C_4$  cycle
2. Turions, thick cuticle on leaf surface, CAM pathway
3. Phylloclade, stomatal pits, CAM pathway
4. Phyllode, aerenchyma, high OP of cell sap

98.

The cell gets swell up, when placed in

1. Hypertonic solution
2. Hypotonic solution
3. Ultratonic solution
4. Isotonic solution

99.

Which one of the given reaction does not involve decarboxylation?

1.  $\alpha$ -ketoglutarate  $\rightarrow$  Succinyl CoA
2. Fumarate  $\rightarrow$  Malate
3. Oxalo-succinate  $\rightarrow$   $\alpha$ -ketoglutarate
4. Pyruvate  $\rightarrow$  Acetyl CoA

100.

Kinetin (cytokinin) was first discovered as a breakdown products of

1. DNA
2. t-RNA
3. Spindle fibres
4. m-RNA

101.

The evolution of  $C_4$  photosynthetic system is probably one of the strategies for

1. Maximising the availability of  $CO_2$  and minimising the loss of  $H_2O$
2. Minimising the loss of  $O_2$  and maximising the availability of  $H_2O$
3. Minimising the availability of  $CO_2$  and maximising the loss of  $H_2O$
4. More than one option is correct

102.

The technology of biogas production in india was

- 1 Imported from Japan
- 2 Imported from Denmark
- 3 Imported from USA
- 4 Developed in India due to efforts of IARI and KVIC

103.

When any plane of section passing through the central axis of body, divides the organism into identical halves, it is called

1. Radial symmetry
2. Biradial symmetry
3. Bilateral symmetry
4. Spherical symmetry

104.

In which type of natural selection more individuals acquire peripheral character value at both ends of distribution curve?

- 1 Stabilising selection
- 2 Directional selection
- 3 Disruptive selection
- 4 Balancing selection

105.

Which of the following hormones are secreted by placenta?

- A. Human chorionic gonadotropin
- B. Chorionic thyrotropin
- C. Estrogen
- D. Progesterone

- 1. A only
- 2. A & B
- 3. A,B & C
- 4. A, B, C & D

106.

Mark the correct statement

- 1 MALT constitutes less than 25 percent of the Lymphoid tissue in the human body
- 2 In case of snake bites, the injection which is given to the victim contains preformed antibodies against the snake venom
- 3 Autoimmune diseases like insulin-dependent diabetes, Addison's disease, ulcerative colitis and rheumatoid can be treated by immuno potentiation therapy
- 4 Passive immunity provides relief only after long period and is long-lasting

107.

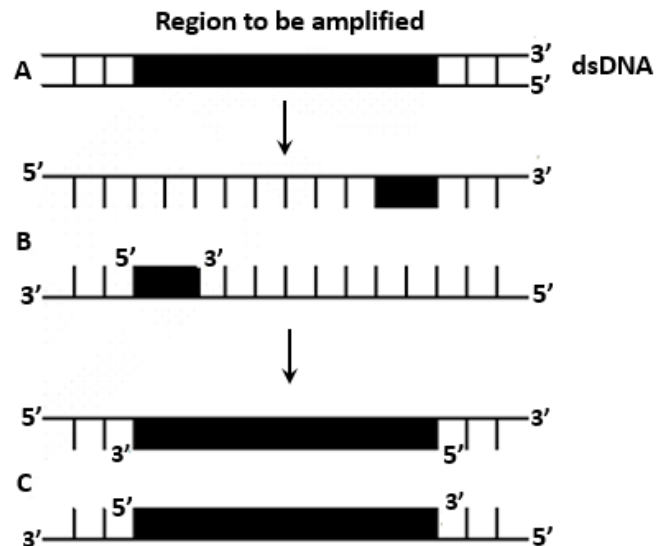
Which of the following complication is/are not related with STDs?

- a. Pelvic inflammatory diseases
- b. Still births
- c. Ectopic pregnancies
- d. Erythroblastosis foetalis

- 1. a & b
- 2. a, b & c
- 3. d only
- 4. c & d

108.

The figure below shows three steps (A, B, C) of polymerase chain reaction (PCR). Select the correct identification together with what it represents



- 1. B - Denaturation at a temperature of about 98°C separating the two DNA strands
- 2. A - Denaturation at a temperature of about 60°C
- 3. C - Extension in the presence of heat stable DNA polymerase
- 4. A - Annealing with two sets of primer

109.

Which of the following is an incorrect statement about inbreeding?

- 1. It is necessary to develop pure lines in any animal
- 2. It exposes recessive genes
- 3. It helps in accumulation of superior genes and elimination of less desirable genes
- 4. It increases heterozygosity

110.

Lymph is/contains

- 1. Blood minus corpuscles and fibrin proteins
- 2. Blood minus RBCs, platelets, some proteins and some salts
- 3. Blood minus RBCs
- 4. Lymph is plasma minus proteins



111.

Which of the following statement is **incorrect**?

1. The acid insoluble fraction, has only four types of organic compounds, proteins, polysaccharides nucleic acids and lipids
2. Chemical compounds found in living organisms are of two types, acid soluble and acid insoluble
3. The compounds which are found in the acid insoluble fraction are called micromolecules
4. The acid soluble pool represents roughly the cytoplasmic composition

112.

Drupes are also called as stone fruits because

1. The seeds are stone like
2. Endocarp is always hard and stony
3. Pericarp is undifferentiated and sclerified
4. The mesocarp is edible in most fruits

113.

Volume of air that will remain in the lungs after a normal expiration is

1. Inspiratory capacity
2. Functional residual capacity
3. Vital capacity
4. Expiratory reserve volume

114.

Chylomicrons are protein-coated small fat globules formed in

1. Lumen of intestine
2. Lacteals of villi
3. Cells of mucosa
4. Blood vessels of villi

115.

Modified aerial stem with the branching of unlimited growth as the photosynthetic structure is

1. Flattened in Opuntia and Euphorbia
2. Fleshy and cylindrical in Euphorbia
3. Cylindrical in Opuntia
4. Cylindrical in Euphorbia and Opuntia

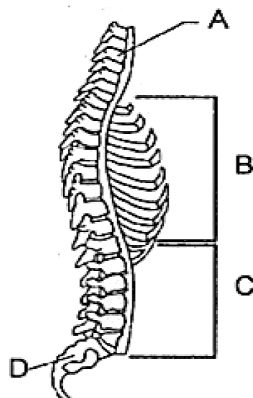
116.

The point of most distinct vision in case of human eye has a high number of cone cells. This point is known as

1. Blind spot
2. Macula lutea
3. Fovea centralis
4. Limbus

117.

Given below is a diagrammatic representation of vertebral column



Which of the labelled structure forms thoracic cage?

1. A
2. B
3. C
4. D

118.

Neurospora, Ustilago and Agaricus are similar in presence of \_\_\_\_\_ during sexual life cycle

1. Endogenous megaspore
2. Dikaryophase
3. Esogenous meiospore
4. Basidiocarp

119.

Choose the odd one out w.r.t. slime moulds

1. Spores possess true cellulosic walls
2. The body moves along decaying twigs and leaves engulfing organic material
3. Can grow and spread over several feet
4. Spores are dispersed by water currents

120.

All given statements stand true w.r.t. Lichens, except

1. These are indicators of  $\text{SO}_2$  pollution, as shown by their abundance in these areas
2. Breathing pores help in gas exchange, these are found on the lower surface of the thallus
3. This association is also termed as helotism
4. Crustose lichens are pioneers of rock succession

121.

If we change the position of genes on chromosomes it will be included in

1. Gene mutation
2. Chromosomal mutation
3. Polyploidy
4. Transversion mutation

122.

Double fertilization is different from single fertilization because of the presence of

1. Syngamy
2. Seed
3. Triple fusion
4. Megaspore and micropore

123.

Which of the following cell organelle is closely associated with ER & helps in formation of plasma membrane during cytokinesis?

1. Centrosome
2. Sphaerosomes
3. Golgi bodies
4. Ribosomes

124.

Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called:

1. Autogamy
2. Xenogamy
3. Geitonogamy
4. Karyogamy

125.

Which of the following is correct w.r.t. lenticels?

- a. Phellogen forms parenchymatous cells on the outer side
- b. It is a lens-shaped opening
- c. Helps in exchange of gases
- d. Present mostly in woody trees

1. a & b correct

2. c & d correct

3. b, c, & d correct

4. All are correct

126.

Which of the following genes is not transcribed from the promoter for  $\beta$ -galactosidase ?

1. Lac-z
2. Lac-i
3. Lac-y
4. Lac-a

127.

If zygote or early embryo up to 8 blastomeres is transferred into the fallopian tube of a female. It is called as:-

1. GIFT
2. ZIFT
3. AI
4. ICSI

128.

What does competitive exclusion theory state?

1. Two closely related species competing for the same resources cannot co-exist indefinitely and competitively inferior one will be eliminated eventually
2. Human beings are the most widespread agents of disturbance
3. In a competition for similar resource, both the participants are benefitted in limited resources
4. In a competition, both the participants are in state of diapause

129.

Filtration and sedimentation are the components of -

1. Primary treatment
2. Secondary treatment
3. Tertiary treatment
4. Quaternary treatment

130.

Thorns of Bougainvillea and tendrils of Cucurbita exhibit

1. Homology
2. Analogy
3. Industrial melanism
4. Adaptive radiation

131.

Release of sperm from seminiferous tubule is

1. Spermiogenesis
2. Spermiation
3. Spermatogenesis
4. Spermiostasis

132.

Sex of progeny is determined by female parent in

1. *Drosophila*
2. Bird
3. Human
4. Grasshopper

133.

Sterile female lacks one X chromosome. This female is suffering from

1. A disease caused due to trisomy
2. Klinefelter's syndrome
3. Turner's syndrome
4. Phenylketonuria

134.

Chemicals involved in transmission of impulses at chemical synapses are called A, they bind to their specific B present on the post synaptic membrane, Here 'A' and 'B' are

A	B
1. Receptors	Substrate
2. Enzymes	Receptors
3. Biocatalysts	Active site
4. Neurotransmitters	Receptors

135.

Which one of the following steps comes after electrophoresis in DNA finger printing?

1. Use of restriction endonuclease
2. Isolation of DNA
3. Southern blotting
4. DNA - RNA hybridization

136.

Find the molality of 15% (w/vol.) solution of  $\text{H}_2\text{SO}_4$  of density  $1.1\text{g/cm}^3$  :

1. 1.2
2. 1.4
3. 1.8
4. 1.6

137.

A compound A when reacted with  $\text{PCl}_5$  and then with ammonia gave B. B when treated with bromine and caustic potash produced C. C on treatment with  $\text{NaNO}_2$  and  $\text{HCl}$  at  $0^\circ\text{C}$  and then boiling produced ortho-cresol. Compound A is:

1. o-toluic acid
2. o-chlorotoluene
3. o-bromotoluene
4. m-toluic acid

138.

Which one of the following is present as an active ingredient in bleaching powder for

bleaching action?

1.  $\text{Ca}(\text{OCl})_2$
2.  $\text{CaO}_2\text{Cl}$
3.  $\text{CaCl}_2$
4.  $\text{CaOCl}_2$

139.

The period number and group number of "Tantalum" ( $Z=73$ ) are respectively :

1. 5, 7
2. 6, 13
3. 6, 5
4. None of the these

140.

The correct order of acidic strength is :

1.  $\text{Cl}_2\text{O}_7 > \text{SO}_2 > \text{P}_4\text{O}_{10}$
2.  $\text{CO}_2 > \text{N}_2\text{O}_5 > \text{SO}_3$
3.  $\text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3$
4.  $\text{K}_2\text{O} > \text{CaO} > \text{MgO}$

141.

At 400K energy of activation of a reaction is decreased by 0.8 kcal in presence of catalyst. Hence rate will be

1. Increased by 2.71 times
2. Increased by 1.18 times
3. Decreased by 2.72 times
4. Increased by 6.26 times

142.

Consider the nitration of benzene using mixed conc.  $\text{H}_2\text{SO}_4$  and  $\text{HNO}_3$ . If a large amount of  $\text{KHSO}_4$  is added to the mixture, the rate of nitration will be

1. slower
2. unchanged
3. doubled
4. faster

143.

Maximum number of electrons in a subshell of an atom is determined by the following

1.  $4l+2$
2.  $2l+1$
3.  $4l-2$
4.  $2n^2$

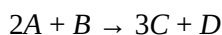
144.

Percentage of free space in a body centred cubic unit cell is

1. 30%
2. 32%
3. 34%
4. 28%

145.

For the reaction



Which of the following does not express the reaction rate?

1.  $-\frac{d[C]}{3 dt}$
2.  $-\frac{d[B]}{dt}$
3.  $\frac{d[D]}{dt}$
4.  $-\frac{d[A]}{2dt}$

146.

1.00 g of non-electrolyte solute (molar mass  $250 \text{ g mol}^{-1}$ ) was dissolved in 51.2 g of benzene. If the freezing point depression constant,  $K_f$  of benzene is  $5.12 \text{ mol}^{-1}$ , the freezing point of benzene will be lowered by :

1. 0.4 K
2. 0.3 K
3. 0.5 K
4. 0.2 K

147.

The structural feature which distinguishes proline from other natural  $\alpha$ -amino acids is

1. It is optically inactive
2. It contains an aromatic group
3. It is a dicarboxylic acid
4. It is a secondary amine

148.

Calculate the wavelength of the spectral line obtained in spectrum of  $\text{Li}^{+2}$  when the transition takes place between levels whose sum is 4 and difference is 2.

1.  $11.4 \times 10^{-6} \text{ cm}$
2.  $1.14 \times 10^{-6} \text{ cm}$
3.  $0.114 \times 10^{-6} \text{ cm}$
4.  $1.14 \times 10^{-8} \text{ cm}$

149.

Which of the following is paramagnetic?

1.  $\text{N}_2$
2.  $\text{H}_2$
3.  $\text{Li}_2$
4.  $\text{O}_2$

150.

The standard electrode potential ( $E^\circ$ ) value of  $\text{Al}^{3+}/\text{Al}$ ,  $\text{Ag}^+/\text{Ag}$ ,  $\text{K}^+/\text{K}$  and  $\text{Cr}^{3+}/\text{Cr}$  are -1.66V, 0.80 V, -2.93 V & -0.79 V respectively. The correct decreasing order of reducing power of the metal is-

1.  $\text{Ag} > \text{Cr} > \text{Al} > \text{K}$
2.  $\text{K} > \text{Al} > \text{Cr} > \text{Ag}$
3.  $\text{K} > \text{Al} > \text{Ag} > \text{Cr}$
4.  $\text{Al} > \text{K} > \text{Ag} > \text{Cr}$

151.

The basic principle of froth floatation is

1. Impurities and metal ore have different wetting properties
2. Impurities and metal ore have different solubility
3. Impurities and metal ore have different diversity
4. Impurities and metal ore have different compressing power

152.

Coordination number is maximum in

1.  $[\text{Co}(\text{NH}_3)_6]^{+3}$
2.  $[\text{Cr}(\text{C}_2\text{O}_4)_3]^{3-}$
3.  $[\text{CoCl}_3(\text{H}_2\text{O})_3]$
4. All have the same coordination number

153.

Irving-Williams order for increasing stability of complexes formed by Co, Ni, Cu and Fe in +2 oxidation state is

1.  $\text{Co} < \text{Ni} < \text{Cu} < \text{Fe}$
2.  $\text{Fe} < \text{Cu} < \text{Ni} < \text{Co}$
3.  $\text{Fe} < \text{Co} < \text{Ni} < \text{Cu}$
4.  $\text{Ni} < \text{Co} < \text{Cu} < \text{Fe}$

154.

Ozone depletion occurs in

1. Tropospheric pollution
2. Stratospheric pollution
3. Air pollution
4. Photochemical smog

155.

Composition of dettol is

- 1 Same as that bithional
- 2 Chloroxylonol and  $\alpha$ -terpineol
- 3 Chlorhexidine gluconate
- 4 Phenyl salicylate and  $\alpha$ -terpineol

156.

Select the correct increasing order of boiling point

1.  $\text{CH}_3\text{OCH}_3 < \text{CH}_3\text{CHO} < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{COOH}$
2.  $\text{CH}_3\text{CHO} < \text{CH}_3\text{OCH}_3 < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_3\text{COOH}$
3.  $\text{CH}_3\text{CHO} < \text{CH}_3\text{OCH}_3 < \text{CH}_3\text{COOH} < \text{CH}_3\text{CH}_2\text{OH}$
4.  $\text{CH}_3\text{OCH}_3 < \text{CH}_3\text{CH}_2\text{OH} < \text{CH}_2\text{CHO} < \text{CH}_3\text{COOH}$

157.

Iodoform test is not given by

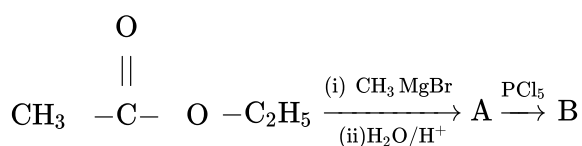
1.  $\text{CH}_3\text{COOH}_2\text{COOC}_2\text{H}_5$
2.  $\text{CH}_3\text{COCH}_3$
3.  $\text{CH}_3\text{CH}_2\text{COCH}_3$
4.  $\text{CH}_3\text{CH}_2\text{CHOHC}_2\text{H}_5$

158.

2-methyl propene gives on oxidation with hot  $\text{KMnO}_4$

1. Acetone
2. Ethanoic acid
3.  $\text{CO}_2$  and  $\text{H}_2\text{O}$
4. Both 1 & 3

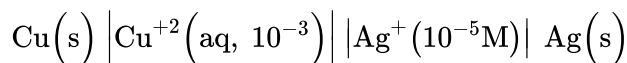
159.



The product B is

1.  $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \text{Cl} \\ | \\ \text{CH}_3 \end{array}$
2.  $\begin{array}{c} \text{O} \\ || \\ \text{CH}_3 - \text{C} - \text{CH}_2 - \text{Cl} \\ | \\ \text{CH}_3 \end{array}$
3.  $\begin{array}{c} \text{CH}_3 - \text{C} - \text{Cl} \\ || \\ \text{O} \end{array}$
4.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$

160.



$$\text{if } E_{\text{Cu}^{+2}/\text{Cu}}^0 = +0.34 \text{ V}$$

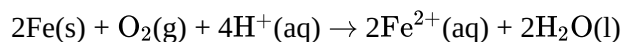
$$E_{\text{Ag}^+/\text{Ag}}^0 = +0.80 \text{ V}$$

$E_{\text{cell}}$  will be : -

1. 0.46 V
2.  $0.46 - \frac{RT}{2F} \ln 10^7$
3.  $0.46 + \frac{RT}{2F} \ln 10^7$
4.  $0.46 - \frac{RT}{2F} \ln 10^2$

161.

Consider the following cell reaction



$E^\circ = 1.67 \text{ V}$ , At  $[\text{Fe}^{2+}] = 10^{-3} \text{ M}$ ,  $P_{\text{O}_2} = 0.1 \text{ atm}$  and  $\text{pH} = 3$ , the cell potential at  $25^\circ\text{C}$  is

1. 1.27 V
2. 1.77 V
3. 1.87 V
4. 1.57 V

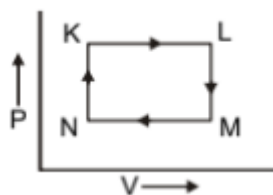
162.

Which of the following order of boiling point is correct?

1.  $\text{H}_3\text{PO}_4 < \text{H}_2\text{SO}_4$
2.  $\text{H}_2\text{O} > \text{H}_2\text{O}_2$
3.  $\text{H}_2\text{O} > \text{SiC}$
4.  $\text{NH}_3 > \text{HF}$

163.

The pair of isochoric among the transformation of state is:



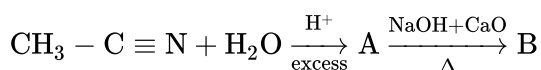
1. K to L and L to M
2. L to M and N to K
3. L to M and M to N
4. M to N and N to K

164.

Which of the following is not an example of condensation polymer:-

1. Dacron
2. Nylon-6
3. Glyptal
4. PTFE

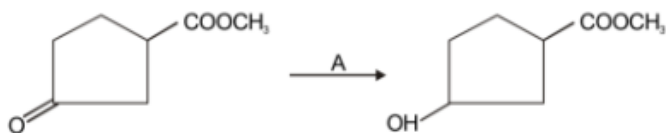
165.



B is?

1.  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{NH}_2$
2.  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{OH}$
3.  $\text{CH}_3 - \overset{\text{O}}{\parallel} \text{C} - \text{ONa}$
4.  $\text{CH}_4$

166.



The correct reagent A is-

1. (i)  $\text{LiAlH}_4$  (ii)  $\text{H}_2\text{O}$
2.  $\text{H}_2$  / Ni
3. (i)  $\text{NaBH}_4$  (ii)  $\text{H}_2\text{O}$
4. Zn-Hg/HCl

167.

The effect that makes 2, 3-dimethyl-2-butene more stable than 2-butene is

1. Resonance
2. Hyperconjugation
3. Steric effect
4. Inductive effect

168.

44 g of a sample of a compound on complete combustion gives 88 g  $\text{CO}_2$  and 36 g of  $\text{H}_2\text{O}$ . The molecular formula of the compound maybe

1.  $\text{C}_4\text{H}_6$
2.  $\text{C}_2\text{H}_6\text{O}$
3.  $\text{C}_2\text{H}_4\text{O}$
3.  $\text{C}_3\text{H}_6\text{O}$

169.

Which set of isomers of  $\text{C}_6\text{H}_4\text{Cl}_2$  is having equal dipole moment with  $\text{C}_6\text{H}_5\text{Cl}$  &  $\text{C}_6\text{H}_6$  respectively?

1. Ortho and Meta
2. Meta and Para
3. Ortho and Para
4. Para and Ortho

170.

The type of isomerism exhibited  $\text{K}_3[\text{Co}(\text{NO}_2)_6]$  and  $\text{K}_3[\text{Co}(\text{ONO})_6]$  :-

1. Linkage
2. Co-ordination
3. Ionization
4. Geometrical

171.

When copper is heated with conc.  $\text{HNO}_3$  it produces?

1.  $\text{Cu}(\text{NO}_3)_2$  and  $\text{NO}_2$
2.  $\text{Cu}(\text{NO}_3)_2$  and  $\text{NO}$
3.  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{NO}$  and  $\text{NO}_2$
4.  $\text{Cu}(\text{NO}_3)_2$  and  $\text{N}_2\text{O}$

172.

$\text{B}_2\text{H}_6$  can't be prepared by

1.  $\text{NaBH}_4 + \text{I}_2 \rightarrow$
2.  $\text{BF}_3 + \text{NaH} \rightarrow$
3.  $\text{B}_3\text{N}_3\text{H}_6 + \text{H}_2\text{O} \rightarrow$
4.  $\text{Mg}_3\text{B}_2 + \text{dil HCl} \rightarrow$

173.

When the temperature is increased

1. the extent of adsorption increases in physisorption
2. the extent of adsorption decreases in physisorption
3. no effect on adsorption
4. extent of adsorption first decreases then increases

174.

For the reaction,  $2\text{Cl(g)} \rightarrow \text{Cl}_2\text{(g)}$ , the correct option is:

1.  $\Delta_r H > 0$  and  $\Delta_r S < 0$
2.  $\Delta_r H < 0$  and  $\Delta_r S > 0$
3.  $\Delta_r H < 0$  and  $\Delta_r S < 0$
4.  $\Delta_r H > 0$  and  $\Delta_r S > 0$

175.

Boron cannot form which one of the following anions?

1.  $\text{BF}_6^{3-}$
2.  $\text{BH}_4^-$
3.  $\text{B(OH)}_4^-$
4.  $\text{BO}_2^-$

176.

The partial pressure of oxygen in a flask containing 16 g  $\text{O}_2$  and 32g  $\text{SO}_2$  is

1. 1/16 of total pressure
2. 1/2 of total pressure
3. 2/3 of total pressure
4. none of the above

177.

A 200 mL flask having oxygen at 220 mm and a 300 mL flask having nitrogen at 100 mm are connected in such a way that  $\text{O}_2$  and  $\text{N}_2$  may combine in their volumes if temperature is kept constant. Find the total pressure of the gaseous mixture.

1. 158 mm
2. 138 mm
3. 148 mm
4. 168 mm

178.

The volume of  $\text{CO}_2$  released at STP on heating 9.85 g of  $\text{BaCO}_3$  on complete decomposition (atomic mass,  $\text{Ba}=137$ ) will be

1. 1.12 L
2. 4.84 L
3. 2.12 L
4. 2.06 L

179.

How many optically active stereoisomers are possible for butan-2-, 3-diol?

1. 1
2. 2
3. 3
4. 4

180.

$\text{H}_2\text{O}_2$  functions as a

1. Bleaching agent
2. Oxidising agent
3. Oxidant for a rocket fuel
4. All of these

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