CBSE EXAMINATION PAPE

NEET-ZOOLOGY

(Solved)

Time allowed : 3 hours

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **180 questions.** All questions are **compulsory.**

ii. This question paper is divided into **1 sections.**

iii. **Section A** – questions number **1 to 180** are multiple choice questions

iv. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

v. Use of calculator is NOT allowed.

Section A

Question 1.

The plant body is thalloid in

(A) Marchantia

(B) Salvinia

(C) Funaria

(D) Sphagnum

Explanation:

The plant body of a liverwort is haploid (n), gametophytic, small, dorsoventrally flattened, thallose, dichotomously branched fixed by unicellular and unbranche

Question 2.

Specialized cells for fixing atmospheric nitrogen in Nostoc are

(A) Nodules

(B) Hormogonia

(C) Akinetes

(D) Heterocysts

Explanation:

Heterocysts are large sized, thick-walled specialised cells which occur in terminal, intercalary or lateral position in filamentous cyanobacteria, e.g., Nostoc. The

Question 3.

The common characteristics between tomato and potato will be maximum at the level of their

(A) Division

(B) Order

(C) Family

(D) Genus

Explanation:

Families are characterised on the basis of both vegetative and reproductive features of plant species. Tomato (*Lycopersicon esculentum*) and potato (*Solanum*

Question 4.

What is common in all the three, Funaria, Dryopteris and Ginkgo?

(A) Well developed vascular tissues

(B) Independent sporophyte

(C) Presence of archegonia

(D) Independent gametophyte

Explanation:

The female sex organ archegonium is formed in bryophytes (Funaria), pteridophytes (Dryopteris) and gymnosperms (Ginkgo).

Question 5.

The pair of quantities having same dimensions is

(A) impulse and surface tension

(B) Young's modulus and energy

(C) angular momentum and work

(D) work and torque

Explanation:

Work = Force × displacement
= $[MLT^{-2}][L]$
= $[ML^2T^{-2}]$

Torque = Force × force arm
= mass × acceleration × length
= $[M] \times [LT^{-2}] \times [L] = [ML^2T^{-2}]$

Question 6.

The displacement 'x' (in meter) of a particle of mass 'm' (in kg) moving in one dimension under the action of a force is related to time 't' (in sec) by $t = \sqrt{x} + 3$. Tl

(A) zero

(B) 6m

(C) 4m

(D) 2m

Explanation:

$\therefore t = \sqrt{x} + 3$

$\Rightarrow \sqrt{x} = t - 3 \Rightarrow x = (t-3)^2$ ...(i)

$v = dx/dt = 2(t-3)=0$

$\Rightarrow t = 3$

From equation (i),

$\therefore x = (3 - 3)^2$

$\Rightarrow x = 0$

Question 7.

Which one of the following is wrongly matched?

(A) Basidiomycetes-Puffballs

(B) Sargassum-Chlorophyll c

(C) Nostoc-Water blooms

(D) Spirogyra-Motile gametes

Explanation:

Cyanobacteria, e.g., Nostoc, grow in such abundance as to form water blooms. Sargassum belongs to brown algae which possess chl a, c, carotenoids, xanth bracket fungi or puffballs. In Spirogyra gametes are non flagellated (non-motile) but similar in size. They show amoeboid movements.

Question 8.

Among flowers of *Calotropis*, tulip, *Sesbania*, *Asparagus*, Colchicine, Sweet pea, Petunia, *Indigofera*, Mustard, Soyabean, Tobacco and groundnut how many

(A) Seven

(B) Eight

(C) Five

(D) Six

Explanation:

Calotropis, tulip, *Asparagus*, colchicine, *Petunia*, mustard, tobacco having valvate aestivation while sweet pea, groundnut, soyabean, *Indigofera*, *Sesbania* hav

Question 9.

How many plants among China rose, *Ocimum*, sunflower, mustard, *Alstonia*, guava, *Calotropis* and *Nerium* (Oleander) have opposite phyllotaxy?

(A) Three

(B) Five

(C) Four

(D) Two

Explanation:

Phyllotaxy is the pattern of arrangement of leaves on the stem or branch.

- *Ocimum*, Guava, *Calotropis* → Opposite phyllotaxy
- China rose, Sunflower, Mustard → Alternate phyllotaxy
- *Alstonia*, *Nerium* (Oleander) → Whorled phyllotaxy

Question 10.

Which of the following statements is not true for stomatal apparatus?

(A) Inner walls of guard cells are thick

(B) Stomata are involved in gaseous exchange

(C) Guard cells are always surrounded by subsidiary cells

(D) Guard cells invariably possess chloroplasts and mitochondria

Explanation:

Sometimes, a few epidermal cells in the vicinity of the guard cells become specialised in their shape and size and are known as subsidiary cells or accessory c

Question 11.

Meristematic tissue responsible for increase in girth of tree trunk is

(A) Phellogen

(B) Lateral meristem

(C) Intercalary meristem

(D) Apical meristem

Explanation:

Lateral meristems are meristems which occur parallel to the circumference of the organs in which they develop. They undergo periclinal divisions producing se cambium and cork-cambium.

Question 12.

Inflorescence is racemose in

(A) Aloe

(B) Tulip

(C) Brinjal

(D) Soyabean

Explanation:

- Inflorescence in family Fabaceae (e.g., soybean) → Racemose
- Inflorescence in family Liliaceae (e.g., tulip, Aloe) → Solitary/cymose; often umbellate
- Inflorescence in family Solanaceae (e.g., brinjal) → Solitary, axillary or cymose as in *Solanum*

Question 13.

During the metaphase stage of mitosis spindle fibres attach to chromosomes at

(A) Both centromere and kinetochore

(B) Centromere, kinetochore and areas adjoining centromere

(C) Kinetochore

(D) Centromere

Explanation:

Kinetochores are small disc-shaped structures at the surface of the centromeres which serve as the sites of attachment of spindle fibres to the chromosomes t coming to lie at the equator.

Question 14.

Uridine, present only in RNA is a

(A) Nucleotide

(B) Purine

(C) Nucleoside

(D) Pyrimidine

Explanation:

The combination of pentose sugar with nitrogenous bases (purines or pyrimidines) is called nucleoside. Examples: adenosine, guanosine, cytidine, thymidine,

Question 15.

The term ‘glycocalyx’ is used for

(A) A layer present between cell wall and membrane of bacteria

(B) Bacterial cell glyco-engineered to possess N-glycosylated proteins

(C) Cell wall of bacteria

(D) A layer surrounding the cell wall of bacteria

Explanation:

Glycocalyx or mucilage is the outermost coating of

bacterial cells/cell wall which is rich in polysaccharides. A thick and tougher mucilage is called capsule which gives gummy or sticky trait to cells. It protects the

Question 16.

Vectors □□ □□ and □□ are such that: □□ □□ = 0 and □□ .□□ = 0. Then the vector parallel to □□ is.

(A) □□+ □□

(B) □□x □□

(C) □□ x □□

(D) □□ and □□

Explanation:

Vector triple product

□□ x (□□ x □□) = □□ (□□ .□□)- □□ (□□ .□□)=0

⇒□□ || (□□ x □□)

Question 17.

Which of the following type of plastids does not contain stored food material?

(A) Elaioplasts

(B) Aleuroplasts

(C) Chromoplasts

(D) Amyloplasts

Explanation:

Chromoplasts are non-photosynthetic coloured plastides which synthesise and stored carotenoid pigmentes. They, therefore, appear orange red and yellow wl
leucoplasts, colourless plastids.

Question 18.

A car is moving in a circular horizontal track of radius 10 m with a constant speed of 10 m/s. A bob is suspended from the roof of the car by a light wire of lengt

(A) π/6

(B) π/3

(C) π/4

(D) 0°

Explanation:

Given: speed = 10 m/s; radius r = 10 m

Angle made by the wire with the vertical is θ.

Then,

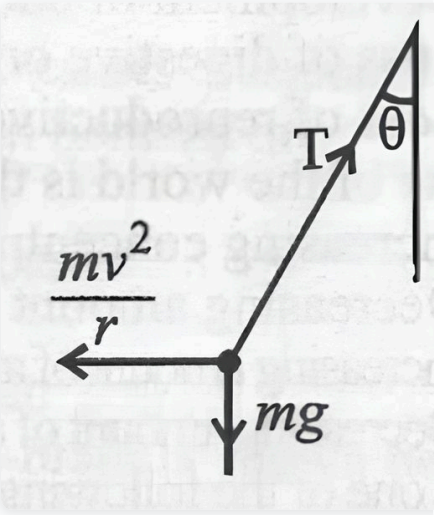
T cos θ = mg

T sin θ = mv^2/r

So,

$\tan\theta = v^2/rg = 10^2/10x\ 10 = 1$

⇒ θ = 45° = π/4



Question 19.

During meiosis I, the chromosomes start pairing at

(A) Diplotene

(B) Pachytene

(C) Zygotene

(D) Leptotene

Explanation:

During zygotene, a substage of Prophase I of meiosis I, chromosomes start pairing together called synapsis. Such paired chromosomes are called as homolog chromosomes called a bivalent or a tetrad.

Question 20.

A person holding a rifle (mass of person and rifle together is 100 kg) stands on a smooth surface and fires 10 shots horizontally. If each bullet has a mass of 1(the person are

(A) −1.6 m s^{-1} ; 16 N

(B) −0.8 m s^{-1} ; 8 N

(C) $-1.6\ m\ s^{-1}$; 8 N

(D) $-0.8\ m\ s^{-1}$; 16 N

Explanation:

According to law of conservation of momentum

$MV + mnv = 0$

$\Rightarrow V = -mNv/M = -(0.01\ kg \times 10 \times 800\ m/s)/100$

$\Rightarrow -0.8\ m/s$

According to work energy theorem,

Average work done = Change in average kinetic energy

i.e., $F_{av} \times S_{av} = \frac{1}{2}mV^2_{rms}$

$\Rightarrow (F_{av}V_{max}t)/2 = \frac{1}{2}m(V^2_{rms}/2)$

$\Rightarrow F_{av} = 8\ N$

Question 21.

Which two distinct microbial processes are responsible for the release of fixed nitrogen as dinitrogen gas (N_2) to the atmosphere?

(A) Bacterial fermentation in cattle, and nitrogen fixation by Rhizobium in root nodules of legumes

(B) Decomposition of organic nitrogen, and conversion of dinitrogen to ammonium compounds

(C) Aerobic nitrate oxidation, and nitrite reduction

(D) Anaerobic ammonium oxidation, and denitrification

Explanation:

In the global nitrogen cycle, bacterial denitrification is recognised as an important process that converts fixed nitrogen to atmospheric nitrogen gas (N_2). In the N_2-production in marine sediments.

Question 22.

A particle with total energy E is moving in a potential energy region U(x). Motion of the particle is restricted to the region where

(A) $U(x) \leq E$

(B) $U(x) = 0$

(C) $U(x) > E$

(D) $U(x) < E$

Explanation:

As the particle is moving in a potential energy region.

$\therefore$ Kinetic energy > 0

And, total energy E = K.E. + P.E.

$\Rightarrow U(x) < E$

Question 23.

One coolie takes 1 minute to raise a suitcase through a height of 2 m but the second coolie takes 30 s to raise the same suitcase to the same height. The pow

(A) 2 : 1

(B) 3 : 1

(C) 1 : 3

(D) 1 : 2

Explanation:

∵ Power P = W/t

⇒ $P_1/P_2 = t_2/t_1$ = 30 s/1 minute = 30 s/60 s = 1/2

(t_1 = 1 minute; t_2 = 30 second given)

Question 24.

Which of the following best illustrates FEEDBACK in development?

(A) Astissue (X) develops, it secretes enzymes that inhibit the development of tissue (Y)

(B) As tissue (X) develops, it secretes something that induces tissue (Y) to develop

(C) As tissue (X) develops, it secretes something that slows down the growth of tissue (Y)

(D) Tissue (X) secretes RNA which changes the development of tissue (Y)

Explanation:

During embryonic development, the primary organiser signals the development of another organ or tissue by secreting chemical factors.

Question 25.

The viability of seeds is tested by

(A) DMSO

(B) 2,3, 5 triphenyl tetrazolium chloride

(C) Safranine

(D) 2, 6 dichlorophenol indophenols

Explanation:

Dehydrogenase enzymes present in living tissue reduce the tetrazolium chloride to formazan, a reddish,water insoluble compound. This reaction occurs in or r
weak Jiving tissue produce an abnormal colour. Dead tissues do not stain, remaining usually white.

Question 26.

Two discs are rotating about their axes, normal to the discs and passing through the centres of the discs. Disc D_1 has 2 kg mass and 0.2 m radius initially angu
discs are brought in contact due to face, with their axes of rotation coincident. The final angular velocity (in rad s^{-1}) of the system is

(A) 100

(B) 120

(C) 60

(D) 40

Explanation:

Given: m_1 = 2 kg ; m_2 = 4 kg
r_1 = 0.2 m ; r_2 = 0.1 m
ω_1 = 50 rad s^{-1} ; ω_2 = 200 rad s^{-1}

As, angular momentum,

$I_1\omega_1 + I_2\omega_2 = (I_1 + I_2)\omega$

$\therefore \omega_f = (I_1\omega_1 + I_2\omega_2)/(I_1 + I_2)$
$= (½m_1r_1^2\omega_1 + ½m_2r_2^2\omega_2)/(½m_1r_1^2 + ½m_2r_2^2)$

By putting the value of m_1, m_2, r_1, r_2 and solving we get

100 rad s^{-1}

Question 27.

The radius of the earth is R and the radius of earth. Both have almost equal average mass-density. If V_p and V_E are escape velocities of the planet and the e

(A) V_E = 3 V_p

(B) V_p = 2V_E

(C) V_E = 1.5V_p

(D) V_p = 1.5 V_E

Explanation:

Escape velocity,

$V_e = \sqrt{(2GM_E/R_E)}$
$= \sqrt{2G/ R_E (4/3 \pi R_E^3 \rho_E)} = R\sqrt{(8/3 \pi G \rho_E)}$
$\Rightarrow V_e \propto R_e \Rightarrow V_p/V_E = R_p/R_E = 2$
$\Rightarrow V_p = 2V_E$

Question 28.

A particle of mass m is kept at rest at a height 3R from the surface of earth, where R is radius of earth and M is mass of earth. The minimum speed with which

(A) $(2g /4)^{1/2}$

(B) $(gR/4)^{1/2}$

(C) $(GM/2R)^{1/2}$

(D) $(GM/R)^{1/2}$

Explanation:

As we know, the minimum speed with which a body is projected so that it does not return back is called escape speed.
$V_e = \sqrt{2GM/r} = \sqrt{2GM/ R +h} = \sqrt{2GM/4R}$
$= (GN/2R)^{1/2}$ ($\because$ h = 3R)

Question 29.

The pineapple which under natural conditions is difficult to blossom has been made to produce fruits throughout the year by application of

(A) Cytokinin

(B) NAA, 2,4-D

(C) Phenyl acetic acid

(D) IAA, IBA

Explanation:

Plants which are difficult to flower can be made to do so by spraying them with 2,4,-D (2,4 dichlorophenoxy acetic acid) and NAA (napthalene acetic acid) whic

Question 30.

Which of the following elements is a constituent of biotin?

(A) Sulphur

(B) Magnesium

(C) Calcium

(D) Phosphorus

Explanation:

Biotin, also known as vitamin H, is a water-soluble B-vitamin. It is a coenzyme for carboxylase enzymes, involved in the synthesis of fatty acids, isoleucine, val

Question 31.

Bundle sheath cells

(A) Are rich in RuBisCO

(B) Are rich in PEP carboxylase (c) Lack RuBisCO

(C) Lack RuBisCO

(D) Lack both RuBisCO and PEP carboxylase

Explanation:

In C_4 plants, bundle sheath cells are rich in RuBisCO, but lack PEPcase. The CO_2 released in the bundle sheath cells enters the C_3 or the Calvin pathway, cor the C_3 and C_4 plants.

Question 32.

Which one of the following statements is correct?

(A) Cleistogamous flowers are always autogamous

(B) Geitonogamy involves the pollen and stigma of flowers of different plants

(C) Xenogamy occurs only by wind pollination

(D) Chasmogamous flowers do not open at all

Explanation:

Cleistogamous flowers do not expose their reproductive parts. Anthers and stigma lie close to each other. Pure autogamy occurs since there is no chance of c and *Oxalis autoseila.*

Question 33.

Megaspores are produced from the megaspore mother cells after

(A) Meiotic division

(B) Mitotic division

(C) Formation of a thick wall

(D) Differentiation

Explanation:

Single Megaspore Mother Cell (MMC) with dense cytoplasm and a prominent nucleus gets differentiated from nucellus near the micropylar region. This Megas formation is known as megasporogenesis.

Question 34.

Syngamy can occur outside the body of the organism in

(A) Fungi

(B) Mosses

(C) Algae

(D) Ferns

Explanation:

In most aquatic organisms, such as a majority of algae and fishes as well as amphibians, syngamy occurs in the external medium (water), *i.e.*, outside the bod

Question 35.

Animal vectors are required for pollination in

(A) Maize

(B) Vallisneria

(C) Mulberry

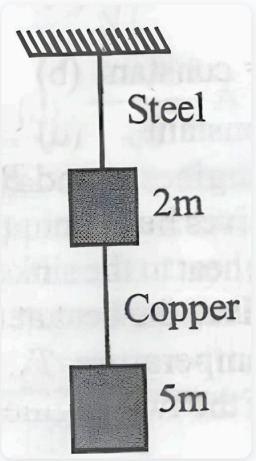
(D) Cucumber

Explanation:

There are different types of vectors involved in pollination. For example, Maize, mulberry → pollination by wind. *Vallisneria* → pollination through water (hydrop

Question 36.

If the ratio of diameters, lengths and Young's modulus of steel and copper wires shown in the figure are p, q and s respectively, then the corresponding ratio of



(A) $5q/(7sp^2)$

(B) $7q/(5sp)$

(C) $2q/(5sp)$

(D) $7q/(5sp^2)$

Explanation:

From formula,

Increase in length,

$\Delta L = FL/AY = 4FL/(\pi D^2 Y)$

$\Delta L_s/\Delta L_c = (F_s/F_c)(D_c/D_s)^2(Y_c/Y_s)$
$= 7/5 \times (1/p)^2 \times (1/5)^4$
$= 7q/(5p^2)$

Question 37.

Which of the following statements is correct?

(A) Sporopollenin can withstand high temperatures as well as strong acids and alkalis

(B) Sporopollenin is made up of inorganic materials

(C) Sporopollenin can be degraded by enzymes

(D) Sporopollenin can withstand high temperatures but not strong acids

Explanation:

Pollen grains are generally spherical and have a prominent two-layered wall. The hard outer layer called the exine is made up of sporopollenin, one of the mos

Question 38.

Albuminous seeds store their reserve food mainly in

(A) Cotyledons

(B) Endosperm

(C) Hypocotyl

(D) Perisperm

Explanation:

Endosperm is the nutritive tissue which provides nourishment to the embryo in seed plants. Albuminous seeds retain a part of endosperm as it is not complete

Question 39.

Random unidirectional change in allele frequencies that occurs by chance in all populations and especially in small populations is known as

(A) Natural selection

(B) Genetic drift

(C) Mutation

(D) Migration

Explanation:

Genetic drift is random change in allele number and frequency in a gene pool due to chance (*e.g.*, small population size). It is caused by sampling error in the

Question 40.

A fluid is in streamline flow across a ‘horizontal pipe of variable area of cross section. For this which of the following statements is correct?

(A) Velocity and pressure both are maximum at the widest part of the pipe

(B) Velocity and pressure both are maximum at the narrowest part of the pipe

(C) The pipe and the pressure is minimum at the widest part of the pipe

(D) The velocity is maximum at the narrowest part of the pipe and pressure is maximum at the widest part of the pipe

Explanation:

According to Bernoulli's theorem,

p + 1/2 ρv² = constant and Av = constant

If A is minimum, v is maximum, P is minimum.

Question 41.

The density of water at 20°C is 998 kg/m³ and at 40°C is 992 kg/m³. The coefficient of volume expansion of water is

(A) 10^{-4}/°C

(B) 3×10^{-4}/°C

(C) 2×10^{-4}/°C

(D) 6×10^{-4}/°C

Explanation:

$T_1 = 20°C$; $T_2 = 40°C$

$\rho_{20} = 998$ kg/m³; $\rho_{40} = 992$ kg/m³

As $\rho_T_2 = \rho_T_1 / 1 + \gamma\Delta T = \rho_T_1/1 + \gamma(T_2 - T_1)$

$\therefore 992 = 998 / 1 + \gamma(40 - 20) \Rightarrow 992 = 998 / 1 + 20\gamma$

$\Rightarrow 20\gamma = 998/992 - 1 = 6/992$

$\Rightarrow \gamma = 6/992 \times 1/20 = 3 \times 10^{-4}$ /°C

Question 42.

Two metal rods 1 and 2 of same lengths have same temperature difference across their ends. Their thermal conductivities are K_1 and K_2 and cross-sectional a

(A) $4K_1A_1 = K_2A_2$

(B) $K_1A_1 = 2K_2A_2$

(C) $K_1A_1 = 4K_2A_2$

(D) $K_1A_1 = K_2A_2$

Explanation:

$Q_1 = 4Q_2$ (Given)

$\Rightarrow K_1A_1\Delta t/L = 4.K_2A_2\Delta t/L \Rightarrow K_1A_1 = 4K_2A_2$

Question 43.

Which of the following is not a property of the genetic code?

(A) Ambiguous

(B) Non-overlapping

(C) Universal

(D) Degeneracy

Explanation:

Genetic code is the relationship of amino acid sequence in a polypeptide and nucleotide/base sequence in mRNA/antisense strand of DNA. It is universal, i.e., with no base being member of two codons, degeneracy, i.e., some amino acids are coded by more than one codon, hence the code is degenerate, unambiguo

Question 44.

Genetic variation in a population arises due to

(A) Reproductive isolation and selection

(B) Mutations as well as recombination

(C) Mutations only

(D) Recombination only

Explanation:

Crossing over leads to recombination of genetic material on two chromosomes. Mutation alters DNA sequences, changing genotype and phenotype. Along wit

Question 45.

Satellite RNAs are present in some

(A) Plant viruses

(B) Prions

(C) Viroids

(D) Bacteriophages

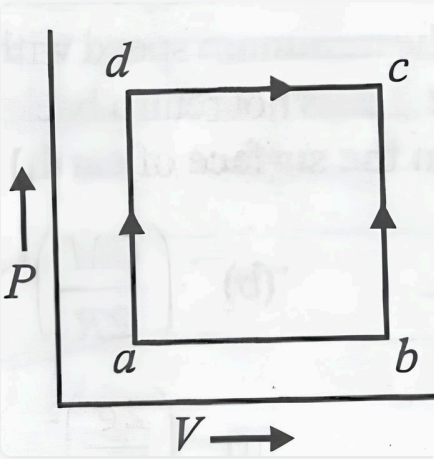
Explanation:

Plant viruses often contain parasites of their own, referred to as satellites. Satellite RNAs are dependent on their associated (helper) virus for both replication

and encapsidation. Example—Tobacco Necrosis Virus (TNV). Viroids are infectious agents smaller than viruses. Bacteriophages are viruses that infect the 'ba

Question 46.

A system is shown in the figure to a state c by two paths adc and abc. The internal energy at a is U_a = 10 J. Along the path adc the system absorbs δQ_1 = 50 J done along the path abc is



(A) 36J

(B) 10J

(C) 12J

(D) 6 J

Explanation:

From first law of thermodynamics

Q_adc = ΔU_adc + W_adc

50 J = ΔU_adc + 20 J

ΔU_adc = 30 J

Again,

$Q_{abc} = \Delta U_{abc} + W_{abc}$

$W_{abc} = Q_{abc} - \Delta U_{abc}$

$= Q_{abc} - \Delta U_{adc}$

$= 36\ J - 30\ J$

$= 6\ J$

Question 47.

One of the most frequently used techniques in DNA fingerprinting is

(A) AFLP

(B) VNTR

(C) SSCP

(D) SCAR

Explanation:

The technique of DNA fingerprinting was developed by Dr. Alec Jeffrey in 1984. It is a technique generally using repeated sequences (repetitive DNA) in the hu vary in number from person to person and are called variable number of tandem repeat (VNTR). VNTR belongs to class of satellite DNA referred to as minisat

Question 48.

Which one of the following vectors is used to replace the defective gene in gene therapy?

(A) Ti plasmid

(B) Adenovirus

(C) Cosmid

(D) Ri plasmid

Explanation:

Adenovirus is non-enveloped dsDNA virus which cause respiratory diseases. Adenovirus is used as a vehicle to administer targeted therapy in the form of recc a major effort is made to limit hepatotoxicity and prevent multiple organ failure.

Question 49.

Which of the following relations does not give the equation of an adiabatic process, where terms have their usual meaning?

(A) PV^{γ} = constant

(B) $TV^{\gamma-1}$ = constant

(C) $P^{\gamma}\ T^{1-\gamma}$ = constant

(D) $P^{1-\gamma}T^{\gamma}$ = constant

Explanation:

Adiabatic equations of state are

PV^{γ} = constant $TV^{\gamma-1}$ = constant

$P^{1-\gamma}T^{\gamma}$ = constant

Question 50.

Which of the following statements is not true about somatic embryogenesis?

(A) Somatic embryo is induced usually by an auxin such as 2, 4-D

(B) Somatic embryos can develop from microspores

(C) The pattern of development of a somatic embryo is comparable to that of a zygotic embryo

(D) A somatic embryo develops from a somatic cell

Explanation:

Somatic embryogenesis is a process where a plant or embryo is derived from a single somatic cell or group of somatic cells. Somatic embryos are formed from or seed coat is formed around a somatic embryo.

Question 51.

Genes of interest can be selected from a genomic library by using

(A) Gene targets

(B) DNA probes

(C) Cloning vectors

(D) Restriction enzymes

Explanation:

A hybridization probe is a fragment of DNA of variable length which is used in DNA samples to detect the presence of nucleotide sequence (the DNA target) th sequence allow probe target base-pairing due to complementarity between the probe and target.

Question 52.

During the process of isolation of DNA, chilled ethanol is added to

(A) Remove proteins such as histones

(B) Precipitate DNA

(C) Break open the cell to release DNA

(D) Facilitate action of restriction enzymes

Explanation:

Ethanol is non-polar molecule while DNA is a polar molecule, it has a net negative charge due to the phosphate groups attached to it. When DNA is placed in a

Question 53.

RNA interference involves

(A) Silencing of specific mRNA due to complementary RNA

(B) Interference of RNA in synthesis of DNA

(C) Synthesis of mRNA from DNA

(D) Synthesis of cDNA from RNA using reverse transcriptase

Explanation:

RNA is a method of cellular defense in all eukaryotes. It is a system within living cells that helps to control the activity of specific genes. This method involves s [silencing]. Source of ds RNA is retrovirus (having RNA genome) or transposons (mobile genetic material).

Question 54.

Benthic organisms are affected most by

(A) Water-holding capacity of soil

(B) Light reaching the forest floor

(C) Surface turbulence of water

(D) Sediment characteristics of aquatic ecosystems

Explanation:

The sediment characteristics often determine the type of benthic animals that can thrive there.

Question 55.

Which of the following has maximum genetic diversity in India?

(A) Rice

(B) Mango

(C) Wheat

(D) Groundnut

Explanation:

During the period 1960 to 2000 rice production went up from 35 million tonnes to 89.5 million tonnes. This was due to the development of semi-dwarf varieties

Question 56.

Which organization publishes the Red Data Book?

(A) GEF

(B) IUCN

(C) UNEP

(D) WWF

Explanation:

IUCN or WCN maintains a red data book which is a catalogue of threatened plants and animals facing risk of extinction. The IUCN red list (2004) documents tl

Question 57.

The largest tiger reserve in India is

(A) Nagarhole

(B) Valmiki

(C) Periyar

(D) Nagarjunsagar-Srisailam

Explanation:

Nagarjunasagar-Srisailam Tiger Reserve is the largest Tiger reserve in India and the only Tiger Reserve in Andhra Pradesh state.

Question 58.

The second commitment period for Kyoto Protocol was decided at

(A) Cancun

(B) Durban

(C) Bali

(D) Doha

Explanation:

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on climate change which commits its parties by setting i
the Kyoto Protocol" was adopted. The second commitment period was from 1st Jan, 2013 to 31st Dec. 2020.

Question 59.

Which one of the following is a primary consumer in maize field ecosystem?

(A) Lion

(B) Grasshopper

(C) Wolf

(D) Phytoplankton

Explanation:

In an ecosystem, producers (e.g., plants/phytoplankton) belong to first trophic level, herbivores or primary consumer (e.g., grasshopper) to the second and car

Question 60.

The characteristics of class Reptilia are :

(A) d. Marine animals with cartilaginous endoskeleton, body covered with placoid scales

(B) c. Fresh water animals with bony endoskeleton, air-bladder to regulate buoyancy

(C) b. Body covered with moist skin which is devoid of scales, the ear is represented by a tympanum, alimentary canal, urinary and reproductive tracts open i

(D) a. Body covered with dry and cornified skin, scales over the body are epidermal, they do not have external ears

Explanation:

In option (a) all the characteristics belong to class Reptilia. In options (b), (c) and (d) the characteristics belong to the classes Amphibia, Osteichthyes and Cho

Question 61.

Two Carnot engines A and B are operated in series. The engine A receives heat from the source at temperature T_1 and rejects heat to the sink at temperature
value of T are the efficiencies of the two engines equal?

(A) $\sqrt{(T_1T_2^2)}$

(B) T_1T_2

(C) $T_1 - T_2/2$

(D) $T_1 + T_2/2$

Explanation:

Efficiency of engine A, $\eta_1 = 1 - T/T_1$
Efficiency of engine B, $\eta_2 = 1 - T_2/T$
Here, $\eta_1 = \eta_2$
$\therefore T/T_1 = T_2/T \Rightarrow T = \sqrt{(T_1T_2)}$

Question 62.

In a vessel, the gas is at a pressure P. If the mass of all the molecules is halved and their speed is doubled, then the resultant pressure will be

(A) P/2

(B) P

(C) 2P

(D) 4P

Explanation:

$\because P = 1/3.mN/V.v^2_{rms}$
where
m = mass of each molecule
N = total number of molecules
V = volume of the gas
When mass is halved and speed is doubled then

Resultant pressure, $P' = 1/3 \times (m/2) \times N/V \ (2v_{rms})^2$

$= 2P$

Question 63.

Which one of the following animals is correctly matched with its one characteristic and the taxon?

Animal	Chara
(a) Duckbilled platypus	Oviparous
(b) Millipede	Ventral nerve cord
(c) Sea Anemone	Triploblastic
(d) Silverfish	Pectoral and Pelvic fins

(A) a

(B) b

(C) c

(D) d

Explanation:

Duckbilled platypus is oviparous and comes under phylum mammalia. Millipede belongs to the phylum arthropoda. Sea-anemone is diploblastic belongs to phy
wriggling motion that resembles the movement of a fish.

Question 64.

Which one of the following groups of animals reproduces only by sexual means?

(A) Ctenophora

(B) Porifera

(C) Cnidaria

(D) Protozoa

Explanation:

In Ctenophora, sexes are not separate. Reproduction takes place only by sexual means. In Cnidaria, which exist in both forms, polyps produce medusae asex
by formation of gametes. Protozoans come under protista which reproduce asexually and sexually by cell fusion and zygote formation.

Question 65.

Sharks and dogfishes differ from skates and rays by

(A) Their pectoral fins distinctly marked off from cylindrical bodies

(B) Gill slits are ventrally placed

(C) Head and trunk are widened considerably

(D) Distinct demarcation between body and tail

Explanation:

Sharks and dogfishes have cylindrical body while skates and rays have flattened body with winglike pectoral fins which are not distinct from body.

Question 66.

Identify the tissue shown in the diagram and match with its characteristics and its location



(A) Striated muscles, tapering at both-ends, attached with the bones of the ribs

(B) Smooth muscles, show branching, found of the heart

(C) Skeletal muscle, shows striations and closely attached with the bones of the limbs

(D) Cardiac muscles, unbranched muscles, found in the walls of the heart

Explanation:

Skeletal muscle tissue is closely attached to skeletal bones. In a typical muscle such as the biceps, striated (striped) skeletal muscle fibres are bundled togeth

Question 67.

A particle of mass m oscillates along x-axis according to equation x= a sin ωt. The nature of the graph between momentum and displacement of the particle is

(A) ellipse

(B) straight line passing through origin

(C) Circle

(D) hyperbola

Explanation:

As $v^2/a^2\omega^2 + y^2/a^2 = 1$ This is the equation of an ellipse. Hence the graph is an ellipse. P versus x graph is similar to v versus x graph.

Question 68.

Select the correct option with respect to cockroaches

(A) Malpighian tubules convert nitrogenous wastes into urea

(B) The fore wings are tegmina which are used in flight

(C) Males bear short anal styles not present in females

(D) Nervous system comprises of a dorsal nerve cord and ten pairs of ganglion

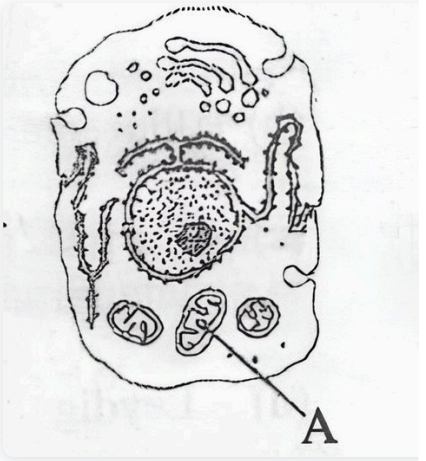
Explanation:

In cockroaches, males bear a pair of short thread-like anal styles which are absent in females.

Question 69.

Select the alternative giving correct identification and function of the

organelle 'A' in the diagram.



(A) Endoplasmic reticulum - synthesis of lipids

(B) Mitochondria - produce cellular energy in the form of ATP

(C) Golgi body - provides packaging material

(D) Lysosomes - secrete hydrolytic enzymes

Explanation:

In fig., (A) shows the cell organelle mitochondria The mitochondria are bounded by two membranes, i.e., outer membrane and inner membrane. Mitochondria down of food molecules which involve glycolysis, Oxidative decarboxylation and oxidative phosphorylation (krebs cycle and respiratory chain).

Question 70.

The length of the wire between two ends of a sonometer is 100 cm. What should be the positions of two bridges below the wire so that the three segments of t

(A) 1500/23 cm, 500/23 cm

(B) 1500/23 cm, 300/23 cm

(C) 1500/23 cm , 2000/23 cm

(D) 300/23 cm, 1500/23 cm

Explanation:

From the formula, $f = 1/x\sqrt{T/m}$

$\Rightarrow f \propto 1/l$

$\therefore l_1 : l_2 : l_3 = 1/f_1 : 1/f_2 : 1/f_3$

$= f_2 f_3 : f_1 f_3 : f_1 f_2$

(Given, $f_1 : f_2 : f_3 = 1 : 3 : 5$)

=15: 5 : 3

Therefore the positions of two bridges below the wire are

15 x 100/ 15+ 5 +3 cm and 15 x 100 + 5 x 100/ 15 + 5 + 3cm

i.e., 1500/23 cm 2000/23 cm

Question 71.

Why is a capsule advantageous to a bacterium?

(A) It allows bacterium to “hide” from host’s immune system

(B) It protects the bacterium from desiccation

(C) It provides means of locomotion

(D) It allows the bacterium to attach to the surface

Explanation:

Capsule is a layer that lies outside the cell wall bacteria. The capsule can protect cells from engulfment by eukaryotic cells, such as macrophages. They also e

Question 72.

Two sources P and Q produce notes of frequency 660 HZ each. A listener moves from P to Q with a speed of 1 ms^{-1} If the speed of sound is 330 m/s, then the

(A) 2

(B) 8

(C) zero

(D) 4

Explanation:

Δf/f = v/c

⇒ (Beats)/2/f = v/c

⇒ Beats = 2 fv/c = 4

Question 73.

Which of the following statements about enzymes is wrong?

(A) Enzymes require optimum pH and temperature for maximum activity

(B) Enzymes are mostly proteins but some are lipids also

(C) Enzymes are denatured at high temperatures

(D) Enzymes are highly specific

Explanation:

Almost all enzymes are proteins. There are some nucleic acids that behave like enzymes. There are called ribozyme (also called RNA enzyme or catalytic RN

Question 74.

A charge ‘q’ is placed at the centre of the line joining two equal charges ‘Q’. The system of the three charges’ will be in equilibrium if‘ "q” is equal to

(A) Q/2

(B) -Q/2

(C) Q/4

(D) -Q/4

Explanation:

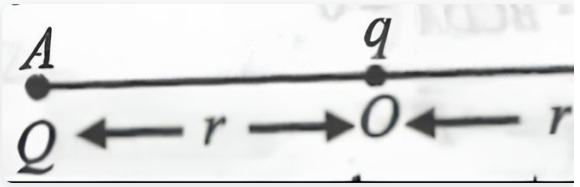
The system of three charges will be in equilibrium.

For this, force between charge at A and B + force between charge at point O and either at A or B is zero

i. e. , $kQ^2/(2r)^2 + kQq/(r)^2 = 0$

By solving we get,

q =- Q/4



Question 75.

An electric dipole of dipole moment p is aligned parallel to a uniform electric field E. The energy required to rotate the dipole by 90^0 is

(A) infinity

(B) pE

(C) p^2E

(D) pE^2

Explanation:

When electric dipole is aligned parallel

θ = 0° and the dipole is rotated by 90° i.e.,

θ = 90°

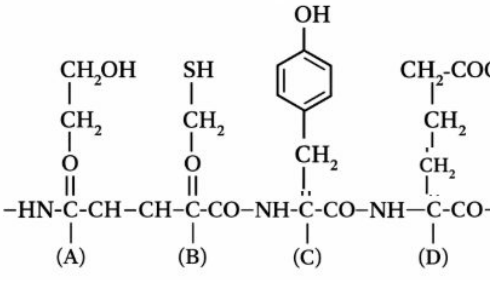
Energy required to rotate the dipole

$W = U_f - U_i = (- pE \cos 90°) - (-pE \cos 0°)$

= pE.

Question 76.

The figure shows a hypothetical tetrapeptide portion of a protein with parts labelled A-D. Which one of the following option is correct?



(A) Adis the sulphur containing amino acid - methionine

(B) D is the acidic amino acid - glutamic acid"

(C) C isan aromatic amino acid - tryptophan

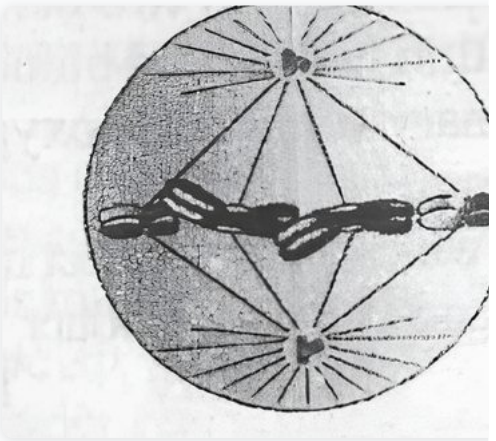
(D) Aisthe C - terminal amino acid and D is N terminal amino acid

Explanation:

Glutamic acid and aspartic acid are acidic amino acids with two carboxylic groups and one amino group

Question 77.

A stage of mitosis is shown in the diagram. Which stage is it and what are its characteristics?



(A) Anaphase – centromeres split and chromatids separate and start moving away

(B) Metaphase – chromosomes moved to spindle equator, chromosomes made up of two sister chromatids

(C) Late prophase – chromosomes move to spindle equator

(D) Metaphase – spindle fibres attached to kinetochores, centromeres split and chromatids separate

Explanation:

Metaphase chromosome is made up of two sister chromatids which are held together by the centromere. Chromosomes are moved to spindle equator and get

Question 78.

A healthy person eats the following diet – 5 gm raw sugar, 4 gm albumin, 10 gm pure buffalo ghee adulterated with 2 gm vegetable ghee (hydrogenated vegeta

(A) 144

(B) 126

(C) 112

(D) 164

Explanation:

Physiological value of carbohydrates is 4.0 kcal/g, proteins 4.0 kcal/g and of fats is 9.0 kcal/g. Hence, 5 g raw sugar will yield 5 × 4.0 = 20.0 kcal

4 g albumin (protein) will yield 4 × 4.0

= 16.0 kcal 10 + 2 g of fat will yield 12 × 9.0 = 108.0 kcal Total yield = 144 kcal.

Question 79.

Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth and as it moves down the alimentary canal?

(A) Salivary maltase → carboxypeptidase → trypsinogen

(B) Disaccharidase like maltase → lipases → nucleases

(C) Pancreatic amylase → salivary amylase → lipases

(D) Salivary amylase → pancreatic amylase → disaccharidases

Explanation:

Chemical process of digestion started in the oral cavity by the hydrolytic action of the carbohydrate (potato contains starch) splitting enzyme, the salivary amyla

Question 80.

Which one of the following is one of the paths followed by air/O_2 during respiration in an adult male *Periplaneta americana* as it enters the animal body?

(A) Hypopharynx, mouth, pharynx, trachea, tissues

(B) Spiracle in metathorax, trachea, tracheoles, oxygen diffuses into cells

(C) Spiracles in prothorax, tracheoles, trachea, oxygen diffuses into cells

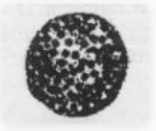
(D) Mouth, bronchial tube, trachea, oxygen enters cells

Explanation:

The number of spiracles in cockroach is 10-pairs (2-pairs in thoracic and 8-pairs in abdominal region). The thoracic pairs of spiracles are present on pleuron be tracheal tube ramifies into fine branches of tracheae, and then tracheoles.

Question 81.

The figure shows a human blood cell. Identify it and give its characteristics.



(A) Blood Cell-B-lymphocyte ; Characteristics - Form about 20% of blood cells involved in immune response

(B) Blood Cell-Basophil ; Characteristics - Secrete serotonin, inflammatory response

(C) Blood Cell-Neutrophil ; Characteristics -Most abundant blood cell, phagocytic

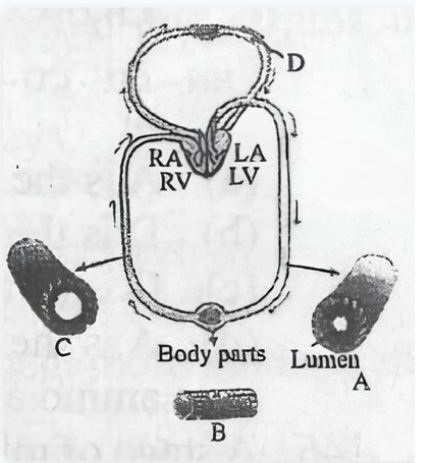
(D) Blood Cell-Monocyte; Characteristics - Life span 3 days, produce antibodies

Explanation:

Basophils secrete histamine, serotonin, heparin, etc., and are involved in inflammatory reactions.

Question 82.

Figure shows blood circulation in humans with labels A to D. Select the option which gives correct identification of label and functions of the part:



(A) C — Vein — thin walled and blood flows in jerks/spurts

(B) D — Pulmonary vein — takes oxygenated blood to heart PO_2 = 95 mmHg

(C) A — Artery — thick walled and blood flows evenly

(D) B — Capillary — thin without muscle layers and wall two cell thick

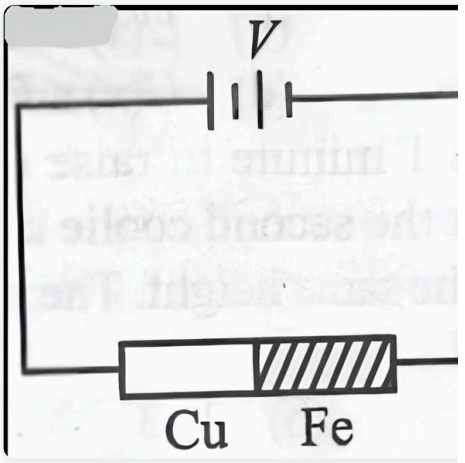
Explanation:

Artery is blood vessel which receives blood from heart, has elastic thick wall shows jerky movements due to pumping activity of heart. Vein is a blood vessel w
Blood capillary is a very fine blood vessel which has a single layered wall. Pulmonary veins are the only veins which carry oxygenated blood. (pO_2 = 95 mmHg

Question 83.

Two rods are joined end to end, as shown. Both have a cross-sectional area of 0.01 cm^2. Each is 1 meter long . One rod is of copper with a resistivity of 1.7 x 1

How much voltage is required to produce a current Of 1 ampere in the rods?



(A) 0.117 V

(B) 0.00145V

(C) 0.0145V

(D) 1.7 x 10^{-6}V

Explanation:

Copper rod and iron rod are joined in series.

$\therefore R = R_Cu + R_Fe = (\rho_1 + \rho_2)l/A$ ($\because R = \rho l/A$)

From Ohm's law, V = RI

$= (1.7 \times 10^{-6} \times 10^{-2} + 10^{-5} \times 10^{-2}) \div 0.01 \times 10^{-4}$ volt

= 0.117 volt ($\because$ I = 1 A)

Question 84.

Select the correct statement with respect to disorders of muscles in humans

(A) An overdose of vitamin D causes osteoporosis

(B) Accumulation of urea and creatine in the joints causes their inflammation

(C) Failure of neuromuscular transmission in myasthenia gravis can prevent normal swallowing

(D) Rapid contractions of skeletal muscles causes muscle dystrophy

Explanation:

Myasthenia gravis is a chronic autoimmune muscular disease. It causes breakdown of neuromuscular junction due to which the brain loses control over muscl
and inability to control facial expressions.

Question 85.

Select the option which shows correct matching of animal with excretory organs and excretory product.

Animal	Excretory organs
(a) Housefly	Renal tubules
(b) Labeo (Rohu)	Nephridial tubes
(c) Salamander	Kidney
(d) Peacock	Kidney

(A) b

(B) a

(C) d

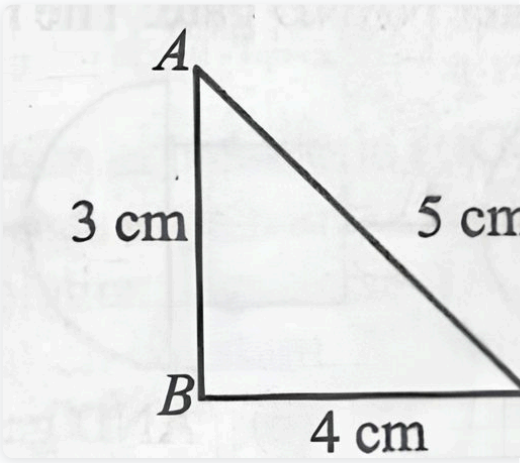
(D) c

Explanation:

Salamander (Amphibia; Caudata) excrete urea by help of kidneys.

Question 86.

A 12 cm wire is given a shape of a right angled triangle ABC having sides 3 cm, 4 cm and 5 cm as shown in the figure. The resistance between two ends (4B,



(A) 21:24:25

(B) 27:32:35

(C) 9:16:25

(D) 3:4:5

Explanation:

Resistance is directly proportional to length.

1/R_AB = 1/3 + 1/4 + 5 = (4 + 5)+ 3/(3)(4 + 5)

R_AB = 3×(4 + 5)/3 + (4 + 5) = 27/12

Similarly,

$R_{BC} = 4\times(3 + 5)/4 + (3 + 5) = 32/12$

$R_{AC} = 5\times(3 + 4)/5 +(3 + 4) = 35/12$

$\therefore R_{AB} : R_{BC} : R_{AC} = 27 : 32 : 35$

Question 87.

Ten identical cells connected in series are needed to heat a wire of length one meter and radius ‘r' by 10°C in time 't'. How many cells will be required to heat tl

two meter of the same radius by the same temperature in time ‘t'?

(A) 30

(B) 40

(C) 20

(D) 10

Explanation:

Resistance is directly proportional to length of the wire. As length is doubled, so mass is doubled and resistance is doubled.

We have

$(10E)^2/R \times t = mS\Delta T$,Now, $(nE)^2t/2R = (2m)S\Delta T$

$\Rightarrow n^2E^2t / 2R = 2.10^2E^2t/R$

$\Rightarrow n = 20$

Question 88.

A long straight wire carries a certain current and produces a magnetic field of 2×10^{-4} weber/m^2 at a perpendicular distance of 5cm from the wire. An electron

from the wire moves with a velocity 10^7 m/s towards the wire along perpendicular to it. The force experienced by the electron will be

(charge on electron =1.6×10^{-19} C)

(A) 3.2N

(B) 3.2×10^{-16} N

(C) 1.6×10^{-16} N

(D) Zero

Explanation:

Given:

Magnetic field, $B = 2 \times 10^{-4}$ weber/m^2

Velocity of electron, $v = 10^7$ m/s

Lorentz force,

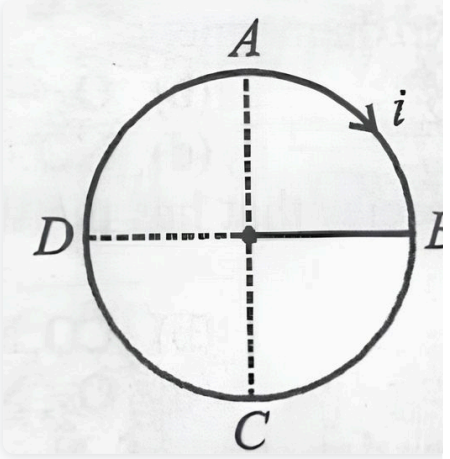
$F = qvB \sin\theta$

$= 1.6 \times 10^{-19} \times 10^7 \times 2 \times 10^{-4} \times \sin 90°$

$= 3.2 \times 10^{-16}$ N

Question 89.

A circular coil ABCD carrying a current i is placed in a uniform magnetic field. If the magnetic force on the segment AB is □□, the force on the remaining segme



(A) -3□□

(B) -□□

(C) □□

(D) 3□□

Explanation:

Here, □□_AB + □□_BCDA = □□

⇒ □□_BCDA = −□□_AB = −□□

(∵ F_AB = □□)

Question 90.

A bar magnet of magnetic moment M is placed at right angles to a magnetic induction B. If a force F is experienced by each pole of the magnet, the length of t

be

(A) MB|F

(B) MF|B

(C) MB|F

(D) F|MB

Explanation:

Torque FL=MB ⇒ L = MB/F

Question 91.

A current of 2.5 A flows through a coil of inductance 5 H. The magnetic flux linked with the coil is

(A) Zero

(B) 12.5Wb

(C) 0.5Wb

(D) 2Wb

Explanation:

Given: Current, I = 2.5 A
Inductance, L = 5 H

Magnetic flux, ϕ = ?

We know, ϕ = LI ⇒ 5 × 2.5 = 12.5 Wb

Question 92.

The primary of a transformer when connected to a dc battery of 10 volt draws a current of 1 mA. The number of turns of the primary and secondary windings a respectively

(A) Zero and therefore no current

(B) 10 V and 0.5 mA

(C) 20 V and 0.5 mA

(D) 20 V and 2.0 mA

Explanation:

A transformer is essentially an AC device. DC source so no mutual induction between the coils.

$\Rightarrow E_2 = 0$ and $I_2 = 0$

Question 93.

An electromagnetic wave of frequency v = 3.0 MHz passes from vacuum into a dielectric medium with relative permittivity ε =4.0. Then

(A) wavelength and frequency both remain unchanged

(B) wavelength is halved and frequency remains unchanged

(C) wavelength is doubled and frequency becomes half

(D) wavelength is doubled and frequency is unchanged

Explanation:

Given: Frequency, f = 2 MHz

Relative permittivity, $\in_r = 4$

From the formula,

velocity = $c/\sqrt{\in_r} = c/2 \Rightarrow \lambda' = \lambda/2$

[since frequency remains unchanged]

Question 94.

Two plane mirrors are inclined at 70°. A ray incident on one mirror at angle 0 after reflection falls on second mirror and is reflected from there parallel to first mi

(A) 50^o

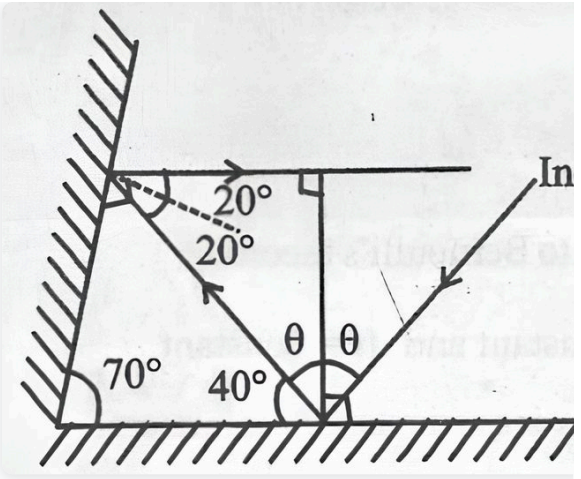
(B) 45^o

(C) 30^o

(D) 55^o

Explanation:

From fig. 40°+ θ = 90° ∴ θ = 90°- 40°=50°



Question 95.

In Young's double slit experiment the distance between the slits and the screen is doubled. The separation between the slits is reduced to half. As a result the

(A) remains unchanged

(B) becomes four times

(C) is halved

(D) is doubled

Explanation:

Fringe width, $\beta = \lambda D/d$

From the question, $D' = 2D$ and $d' = d/2$

$\therefore \beta' = \lambda D'/d' = 4\beta$

Question 96.

A parallel beam of light of wavelength . is incident normally on a narrow slit. A diffraction pattern is formed on a screen placed perpendicular to the direction of

At the second minimum of the diffraction pattern, the phase difference between the rays coming from the two edges of slit is

(A) 3π

(B) 4π

(C) 2π

(D) $\pi\lambda$

Explanation:

Conditions for diffraction minima are:

Path difference, $\Delta x = n\lambda$ and Phase diff. $\delta\phi = 2n\pi$

Path diff. $= n\lambda = 2\lambda$

Phase diff. $= 2n\pi = 4\pi$ ($\because n = 2$)

Question 97.

The de-Broglie wavelength of neutron in thermal equilibrium at temperature T' is

(A) $0.0308/\sqrt{T}$ Å

(B) $30.8/\sqrt{T}$ Å

(C) 3.08/√T Å

(D) 0.308/√T Å

Explanation:

From the formula, $\lambda = h/\sqrt{(2mkT)}$

$= 6.63 \times 10^{-34} / \sqrt{(2 \times 1.67 \times 10^{-27} \times 1.38 \times 10^{-23} \times T)} \cdot m$

(By placing the values of h, m and k)

= 30.8/√T Å

Question 98.

A source of light is placed at a distance of 50 cm from a photocell and the stopping potential is found to be V_0. If the distance between the light source and pho

(A) V_0

(B) $4V_0$

(C) $2V_0$

(D) $V_0/2$

Explanation:

Since stopping potential is independent of distance, the new stopping potential will remain unchanged i.e., new stopping potential = V_0

Question 99.

An electron in hydrogen atom makes a transition $n_1 \rightarrow n_2$ where n_1 and n_2 are principal quantum numbers of the two states. Assuming Bohr's model to be valid n_2 are

(A) $n_1 = 6$ and $n_2 = 2$

(B) $n_1 = 4$ and $n_2 = 2$

(C) $n_1 = 8$ and $n_2 = 2$

(D) $n_1 = 8$ and $n_2 = 1$

Explanation:

$\because T \propto n^3$

$T_1/T_2 = 8T_2/T_2 = (n_1/n_2)^3$

Hence, $n_1 = 2n_2$

Question 100.

How does the binding energy per nucleon vary with the increase in the number of nucleons?

(A) First decreases and then increases with increase in 'mass number

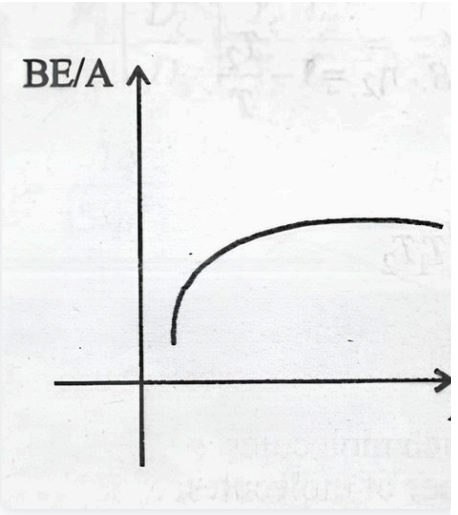
(B) First increases and then decreases with increase in mass number

(C) Decreases continuously with mass number

(D) Increases continuously with mass number

Explanation:

From the graph of BE/A versus mass number A it is clear that, BE/A first increases and then decreases with increase in mass number.



Question 101.

During muscle contraction in humans the

(A) A band remain same

(B) A, H and I bands shorten

(C) Sarcomere does not shorten

(D) Actin filaments shorten

Explanation:

Increase in Ca^{++} level into the sarcoplasm leads to the binding of calcium with a subunit of troponin on actin filaments and thereby remove the masking of acti on actin to form a cross bridge. This pulls the attached actin filaments towards the centre of 'A' band. The 'Z' lines attached to these actins are also pulled inwa shortening of the muscle, *i.e.*, contraction, the 'I' bands get reduced, whereas the 'A' bands retain the length.

Question 102.

α-particles, β-particles and γ-rays are all having same energy. Their penetrating power in a given medium in increasing order will be

(A) γ, α, β

(B) β, γ, α

(C) α, β, γ

(D) β, α, γ

Explanation:

Increasing order of penetrating power :

α< β< γ .

Question 103.

In an unbiased p-n junction, holes diffuse from the p-region to n-region because of

(A) the higher hole concentration in p-region than that in n-region

(B) the higher concentration of electrons in the n-region than that in the p-region

(C) the attraction of free electrons of n-region

(D) the potential difference across the p-n junction

Explanation:

In p-region of p-n junction

holes concentration > electrons concentration and in n- region of p-n junction

electrons concentration > holes concentration.

Question 104.

One way in which the operation of a n-p-n transistor differs from that of a p-n-p

(A) the emitter injects holes into the base of n-p-n

(B) the emitter junction injects minority carriers into the base region of the p-n-p

(C) the emitter injects holes into the base of the p-n -p . and electrons into the base region of n-p-n

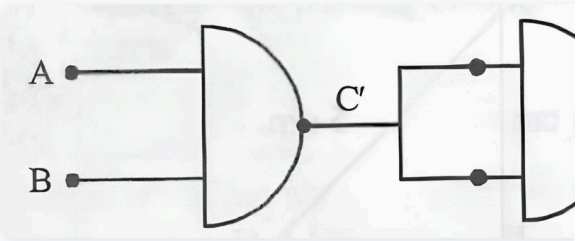
(D) the emitter junction is reversed biased in n-p-n

Explanation:

In p-n-p transistor holes are injected into the base while electrons are injected into the base of n-p-n transistor. Emitter-base junction is forward biased.

Question 105.

The output from a NAND gate is divided into two in parallel and fed to another NAND gate. The resulting gate is a



(A) ORgate

(B) NOR gate

(C) AND gate

(D) NOT gate

Explanation:

$C' = (\overline{A} \cdot \overline{B})^{-} \Rightarrow C = \overline{A} \cdot \overline{B} = A \cdot B$

Hence, the resultant gate is AND gate.

Question 106.

The ratio of radii of gyration of a circular ring and a circular disc, of the same mass and radius, about an axis passing through their centres and perpendicular t

(A) 3 : 2

(B) 1 : √ 2

(C) √2 : 1

(D) 2 : 1

Explanation:

$\because I = MK^2 \therefore K = \sqrt{(I/M)}$

$I_{ring} = MR^2$ and $I_{disc} = 1/2\ MR^2$

$K_1/K_2 = \sqrt{(I_1/I_2)} = \sqrt{MR^2/(MR^2/2)} = \sqrt{2} : 1$

Question 107.

A charge g is located at the centre of a cube. The electric flux through any face is

(A) $4\pi q /6(4\pi\varepsilon_0)$

(B) $\pi q/6(4\pi\varepsilon_0)$

(C) $2\pi q/6(4\pi\varepsilon_0)$

(D) $q/6(4\pi\varepsilon_0)$

Explanation:

Cube has 6 faces. Flux through any face is given by

$\phi = q/6\varepsilon_0 = q4\pi/6(4\pi\varepsilon_0)$

Question 108.

In an experiment it showed that **10 mL of 0.05 M solution of chloride** required **10 mL of 0.1 M solution of $AgNO_3$**. Which of the following will be the formula

(A) XCl_2

(B) XCl_4

(C) X_2Cl

(D) X_2Cl_2

Explanation:

Millimoles of solution of chloride = 0.05 × 10 = 0.5 Millimoles of $AgNO_3$ solution = 10 × 0.1 = 1 So, the millimoles of $AgNO_3$ are double than the chloride solutio

Question 109.

According to the law of photochemical equivalence, the energy absorbed (in ergs/mole) is given as *($h = 6.62 \times 10^{-27}$ erg s, $c = 3 \times 10^{10}$ cm s^{-1}, $N_a = 6.02 \times 10$*

(A) $1.196 \times 10^{16} / \lambda$

(B) $1.196 \times 10^{8} / \lambda$

(C) $2.859 \times 10^{5} / \lambda$

(D) $2.859 \times 10^{16} / \lambda$

Explanation:

E = hc/λ × N_A

$= 6.62 \times 10^{-27} \times 3 \times 10^{10} \times 6.02 \times 10^{23} / \lambda$

$= 1.19 \times 10^{8} / \lambda$ ergs mol^{-1}

Question 110.

Which one of the following arrangements represents the correct order of least negative to most negative electron gain enthalpy for C, Ca, Al, F and O?

(A) Ca < Al < C < O < F

(B) Al < Ca < O < C < F

(C) Al < O < C < Ca < F

(D) C < F < O < Al < Ca

Explanation:

As the nuclear charge increases, the force of attraction between the nucleus and the incoming electron increases and
Ca < Al < C < O < F

Question 111.

In which of the following pair both the species have sp^3 hybridization?

(A) H_2S, BF_3

(B) SiF_4, BeH_2

(C) NF_3, H_2O

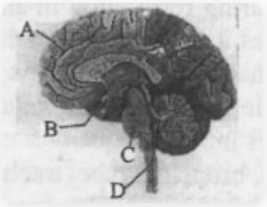
(D) NF_3, BF_3

Explanation:

Applying VSEPR theory, both NF_3 and H_2O are sp^3 hybridized.

Question 112.

A sagittal section of human-brain is shown here. Identify at least two labels from A-D.



(A) A – Cerebral hemispheres; B – Cerebellum

(B) C – Mid brain; D – Cerebellum

(C) B – Corpus callosum; D – Medulla

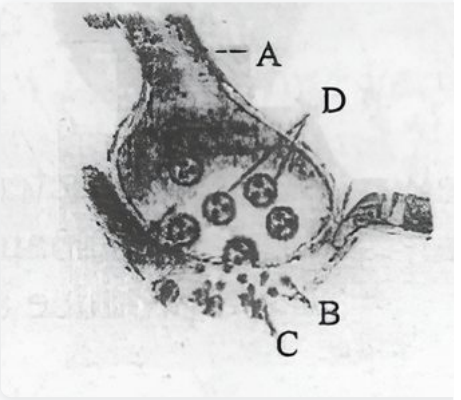
(D) A – Cerebrum; C – Pons

Explanation:

Cerebrum is the first and most developed part of forebrain. It makes 2/3rd part of total brain. Pons is a small spherical projection, which is situated below the m
are thalamus and spinal cord respectively.

Question 113.

The figure shows an axon terminal and synapse. Select the option giving correct identifications of labels A-D



(A) A – Axon terminal; B – Serotonin complex

(B) A – Action potential; C – Neurotransmitter

(C) B – Neurotransmitter; D – Receptor capsules

(D) C – Receptor; D – Synaptic vesicles

Explanation:

In the given figure, A, B, C and D are axon, neurotransmitters, receptors and synaptic vesicles respectively.

Question 114.

Which of the following represents the action of insulin?

(A) Increases blood glucose levels by hydrolysis of glycogen

(B) Increases blood glucose levels by stimulating glycogen production

(C) Decreases blood glucose levels by forming glycogen

(D) Decreases blood glucose level by promoting cellular uptake of glucose

Explanation:

Insulin is a peptide hormone, which plays a major role in the regulation of glucose homeostasis. Insulin acts mainly on hepatocytes and adipocytes (cells of ad into glycogen (glycogenesis) in the target cells.

Question 115.

Norepinephrine: (1) Is released by sympathetic fibres

(2) Is released by parasympathetic fibres

(3) Increases the heart rate

(4) Decreases blood pressure

Which of the above said statements are correct?

(A) (1) and (4)

(B) (2) and (3)

(C) (1) and (3)

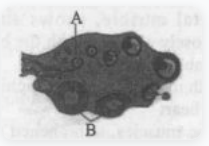
(D) (2) and (4)

Explanation:

Norepinephrine is released by sympathetic fibres *i.e.*, rapidly secreted in response to stress of any kind and, during emergency situations. It increases the hea

Question 116.

The figure shows a section of human ovary. Select the option which gives the correct identification of A and B with function/characteristic



(A) B – Corpus luteum – secretes estrogen

(B) A – Tertiary follicle – forms Graafian follicle

(C) B – Corpus luteum – secretes progesterone

(D) A – Primary oocyte – it is the prophase – I of the meiotic division

Explanation:

The corpus luteum is a temporary endocrine structure in female mammals that is involved in the production of relatively high levels of progesterone. A marked these follicles degenerate during the phase from birth to puberty.

Question 117.

Select the option which correctly matches the endocrine gland with its hormone and its function.

Endocrine gland	Hormone	
(a) Ovary	FSH	Stimulates follicular development and the secretion of estrogens.
(b) Placenta	Estrogen	Initiates secretion of the milk.
(c) Corpus luteum	Estrogen	Essential for maintenance of endometrium.
(d) Leydig	Androgen	Initiates the cells production of sperms.

(A) a

(B) b

(C) c

(D) d

Explanation:

Leydig cells or interstitial cells, which are present in the intertubular spaces produce a group of hormones called androgens mainly testosterone. Androgens pl

Question 118.

One of the following is not a method of contraception – which one?

(A) Lippes loop

(B) Pills of a combination of oxytocin and vasopressin

(C) Condoms

(D) Tubectomy

Explanation:

Oxytocin is birth hormone and acts on the smooth muscles of our body and stimulates their contraction. Vasopressin acts mainly at the kidney and stimulates r
hormone (ADH).

Question 119.

The foetal ejection reflex in humans triggers release of

(A) Oxytocin from maternal pituitary

(B) Oxytocin from foetal pituitary

(C) Human Chorionic Gonadotropin (hCG) from placenta

(D) Human Placental Lactogen (hPL) from placenta

Explanation:

Parturition is induced by a complex neuroendocrine mechanism. The signals for parturition originate from the fully developed foetus and the placenta which inc
pituitary.

Question 120.

'Which one of the following statements is correct rega Sexually Transmitted Diseases (STD)?

(A) Haemophilia is one of the STD

(B) Genital herpes and sickle-cell anaemia are both STD

(C) The chances ofa 5 year boy contacting a STD are very little

(D) A person may contact syphilis by sharing milk with one already suffering from the disease

Explanation:

STDs are more common in 15-24 years age group. Gonorrhoea, syphilis, genital herpes, chlamydiasis, genital warts, trichomoniasis, hepatitis-B and AIDS are unaffected carrier female to some of male progeny. Sickle cell anaemia is an autoimmune linked recessive trait in which both the partners are carrier for the ge

Question 121.

The stage transferred into the uterus after induced fertilization of ova in the laboratory is

(A) Zygote

(B) Embryo at 4 blastomere stage

(C) Embryo at 2 blastomere stage

(D) Morula

Explanation:

In Intra-Uterine Transfer (IUT) embryo with more than 8-blastomeres stage (morula) is used for transfer into the uterus.

Question 122.

Which one is the incorrect statement with regards to the importance of pedigree analysis?

(A) It confirms that DNA is the carrier of genetic information

(B) It helps to trace the inheritance of a specific trait

(C) It helps to understand whether the trait in question is dominant or recessive

(D) It confirms that the trait is linked to one of the autosome

Explanation:

Pedigree is a chart showing the record of inheritance of certain genetic traits for two or more ancestral generations of an individual, abnormality or disease.

Question 123.

In our society women are blamed for producing female children. Choose the correct answer for the sex-determination in humans

(A) Due to the genetic make up of the particular sperm which fertilizes the egg

(B) Due to the genetic make up of the egg

(C) Due to some defect like asperimia in man

(D) Due to some defect in the women

Explanation:

In case of humans, the sex determining mechanism is XY type. Out of 23 pairs of chromosomes, 22 pairs are exactly same in both males and females called a determinant of male characteristic. In case the ovum fertilises with a sperm carrying X-chromosome the zygote develops into a female (XX) and the fertilisation

Question 124.

Down's syndrome in humans is due to

(A) Two 'Y' chromosomes

(B) Three 'X' chromosomes

(C) Three copies of chromosome 21

(D) Monosomy

Explanation:

Down's syndrome is the chromosomal disorders due to the presence of an additional copy of the chromosome number 21 (trisomy of 21). The affected individu
retarded.

Question 125.

The figure gives an important concept in the genetic implication of DNA. Fill the blanks A, B and C.



(A) A — Erwin Chargaff; B — translation; C — replication

(B) A — James Watson; B — replication; C — extension

(C) A — Francis Crick; B — translation; C — transcription

(D) A — Maurice Wilkins; B — transcription; C — translation

Explanation:

In this question A is Francis Crick, B is translation and C is transcription. It is unidirectional flow of information from DNA to mRNA (transcription) and then deco

Question 126.

In an inducible operon, the genes are

(A) Always expressed

(B) Usually not expressed unless a signal turns them "on"

(C) Usually not expressed unless a signal turns them "off"

(D) Never expressed

Explanation:

Inducible operons are usually switched off. This is a type of operon which is switched on when a chemical called inducer is present. The inducer is almost alwa

Question 127.

The finch species of Galapagos Islands are grouped according to their food sources. Which of the following is

(A) Seeds

(B) Carrion

(C) Tree buds

(D) Insects

Explanation:

Darwin observed an amazing diversity of creatures on Galapagos islands. He realised that there were many varieties of finches in the same island like seed-ea

Question 128.

Dinosaurs dominated the world in which of the following geological era?

(A) Coenozoic

(B) Devonion

(C) Jurassic

(D) Mesozoic

Explanation:

Dinosaurs dominated the world in mesozoic era. In Triassic period, giant reptiles (dinosaurs) emerged. In Jurassic period, dinosaurs diversified and abundant (

Question 129.

Identify the site where Wuchereria bancrofti is normally found on human body

(A) Bloog vessels of the thigh region

(B) Skin between the fingers

(C) Lymphatic vessels of the lower limbs

(D) Muscles of the legs

Explanation:

Wuchereria (W. bancrofti and W. malayi), filarial worms causing chronic inflammation of the organs in which they live for many years, usually the lymphatic ves mainly affected, resulting in gross deformities. The pathogens are transmitted to a healthy person through the bite by the female mosquito vectors.

Question 130.

Which one of the following is a hallucinogenic drug?

(A) Opium

(B) Caffeine

(C) Morphine

(D) Lysergic acid diethylamide

Explanation:

Hallucinogens are drugs that cause illusions and delusions (hallucinations) and change the feelings or perception. Examples are Bhang, Charas, Hashish, Ma having analgesic (pain relieving effect) while caffeine is a stimulant that increases the activity of nervous system, and causes awakening.

Question 131.

Tissue culture technique can produce infinite number of new plants from a small parental tissue. The economic importance of the technique is in raising

(A) Development of new species

(B) Homozygous diploid plants

(C) Variants through picking up somaclonal variations

(D) Genetically uniform population identical to the original parent

Explanation:

The method of producing thousands of plants through tissue culture is called micro-propagation. Each of these plants will be genetically identical to the origina apple have been produced on commercial scale using this method.

Question 132.

Microbe used for biocontrol of pest butterfly caterpillars is

(A) Saccharomyces cerevisiae

(B) Trichoderma sp.

(C) Streptococcus sp.

(D) Bacillus thuringiensis

Explanation:

Microbial biocontrol agent that can be introduced in order to control butterfly caterpillars is the bacteria *Bacillus thuringiensis* (Bt). They are sprayed onto vulne get killed. The bacterial disease will kill the caterpillars, but leave other insects unharmed.

Question 133.

The age pyramid with broad base indicates

(A) High percentage of old individuals

(B) High percentage of young individuals

(C) Low percentage of young individuals

(D) A stable population

Explanation:

Age pyramid is a graphic representation of different age groups of population with pre-reproductive groups at the base, reproductive ones in the middle and po while reproductive are moderate and post-reproductive are fewer.

Question 134.

When man eats fish which feeds on zooplankton which have eaten small plants, the producer in the chain is

(A) Zooplankton

(B) Small plants

(C) Fish

(D) Man

Explanation:

Plants are producers which can prepare their food by the process of photosynthesis. Zooplanktons, fish and man are primary, secondary and tertiary carnivore

Question 135.

Which one of the following is not a parasitic adaptation?

(A) Loss of unnecessary sense organs

(B) Development of adhesive organs

(C) Loss of digestive organs

(D) Loss of reproductive capacity

Explanation:

In parasitism, one species (parasite) is benefited and the other (host) is harmed. Parasites have very high reproduction capacity. The life cycles of parasites ar

Question 136.

Climate of the world is threatened by

(A) Decreasing amount of atmospheric carbondioxide

(B) Increasing amount of atmospheric carbondioxide

(C) Decreasing amount of atmospheric oxygen

(D) Increasing concentration of atmospheric oxygen

Explanation:

The increase in the level of greenhouse gases (e.g., CO_2, CH_4, CFC, N_2O etc.) has led to the considerable heating of earth surface leading to global warming. > N_2O (6%)

Question 137.

Which one of the following is not correct as regards the harmful effects of particulate matter of the size 2.5 micro meters or less?

(A) It can be inhaled into the lungs

(B) It can cause respiratory problems

(C) It can directly enter into our circulatory system

(D) It can cause inflammation and damage to the lungs

Explanation:

According to Central Pollution Control Board (CPCB) particulate size 2.5 micrometers or less in diameter are responsible for causing various breathing inflamm

Question 138.

The outer orbitals of C in ethene molecule can be considered to be hybridized to give three equivalent sp^2 orbitals. The total number of sigma (σ) and pi (π) bo

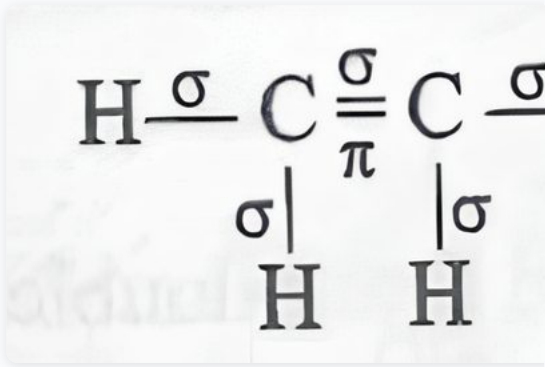
(A) 1 sigma (σ) and 2 pi (π) bonds

(B) 3 sigma (σ) and 2 pi (π) bonds

(C) 5 sigma (σ) and 1 pi (π) bonds

(D) 4 sigma (σ) and 1 pi (π) bond

Answer:



Question 139.

In which of the following ionisation processes the bond energy increases and the magnetic behaviour changes from paramagnetic to diamagnetic?

(A) $O_2 \rightarrow O_2^+$

(B) $N_2 \rightarrow N_2^+$

(C) NO → NO^+

(D) $C_2 \rightarrow C_2^+$

Explanation:

(a) $N_2 \longrightarrow N_2^+$

B.O. 3, 2.5

Bond energy decreases.

Magnetic behaviour changes from diamagnetic to paramagnetic.

(b) $O_2 \longrightarrow O_2^+$

B.O. 2 , 2.5
Bond energy increases.
Magnetic behaviour does not change.

(c) $C_2 \longrightarrow C_2^+$
B.O. 2, 2.5
Bond energy decreases.
Magnetic behaviour changes from diamagnetic to paramagnetic.

(d) $NO \longrightarrow NO^+$
B.O. 2 , 2.5
Bond energy increases.
Magnetic behaviour changes from paramagnetic to diamagnetic.

Question 140.

The pair of species that has the same bond order in the following is:

(A) O_2, N_2

(B) O_2, B_2

(C) NO^-, CN^-

(D) CO, NO^+

Explanation:

No. of electrons in CO = 6 + 8 = 14
No. of electrons in NO^+ = 7 + 8 − 1 = 14
∴ CO and NO^+ are isoelectronic species.
Isoelectronic species have identical bond order.

Question 141.

What is the density of N_2 gas at 227°C and 5.00 atm pressure? (R = 0.0821 atm K^{-1} mol^{-1})

(A) 3.41 g/mL

(B) 2.81 g/mL

(C) 1.40 g/mL

(D) 0.29 g/mL

Explanation:

Density = PM/RT = 5 × 28/0.0821 × 500 = 3.41 g/mL

Question 142.

When 5 litres of a gas mixture of methane and propane is perfectly combusted at 0°C and 1 atmosphere, 16 litre of oxygen at the same temperature and press
$\Delta H_comb\ (C_3H_8) = 2220\ kJ\ mol^{-1}$) is

(A) 32

(B) 317

(C) 38

(D) 477

Explanation:

$CH_4\ (x) + 2O_2\ (2x) \rightarrow CO_2 + 2H_2O$

$C_3H_8\ (5-x) + 5O_2\ 5(5-x) \rightarrow 3CO_2 + 4H_2O$

$2x + 5(5 - x) = 16$
$x = 3\ L$
∴ Heat released
$= 3/22.4 \times 890 + 2/22.4 \times 2220 = 317$

Question 143.

Three thermochemical equations are given below:

(i) $C(graphite) + O_2(g) \rightarrow CO_2(g);\ \Delta_rH° = x\ kJ\ mol^{-1}$

(ii) $C(graphite) + ½\ O_2(g) \rightarrow CO(g);\ \Delta_rH° = y\ kJ\ mol^{-1}$

(iii) $CO(g) + ½\ O_2(g) \rightarrow CO_2(g);\ \Delta_rH° = z\ kJ\ mol^{-1}$

Based on the above equations, find out which of the relationship given below is correct?

(A) x=y -z

(B) x = y + z

(C) y = 2z - x

(D) z = x + y

Explanation:

Applying Hess's law, equation (i) can be obtained by adding equation (ii) and (iii).

∴ x = y + z

Question 144.

At 100°C the K_w of water is 55 times its value at 25°C. What will be the pH of neutral solution? (log 55 = 1.74)

(A) 5.13

(B) 7.87

(C) 7.00

(D) 6.13

Explanation:

K_w at 25°C = 1×10^{-14}
At 25°C
$K_w = [H^+][OH^-] = 10^{-14}$

At 100°C (given)
$K_w = [H^+][OH^-] = 55 \times 10^{-14}$
∵ For a neutral solution
$[H^+] = [OH^-]$
$\therefore [H^+]^2 = 55 \times 10^{-14}$
or $[H^+] = (55 \times 10^{-14})^{1/2}$
∵ $pH = -\log[H^+]$
On taking log on both side
$-\log[H^+] = -\log(55 \times 10^{-14})^{1/2}$
$pH = \frac{1}{2}(-\log 55 + 14\log 10)$
pH = 6.13

Question 145.

Accumulation of lactic acid ($HC_3H_5O_3$, a monobasic acid in tissues leads to pain and a feeling of fatigue. In a 0.10 M aqueous solution, lactic acid is 3.7% diss

(A) 3.7×10^{-4}

(B) 1.4×10^{-4}

(C) 1.4×10^{-5}

(D) 2.8×10^{-4}

Explanation:

$\alpha = \sqrt{(K_a/C)} = 0.037 = \sqrt{(K_a/0.10)}$
$K_a = (0.037)^2 \times 0.10 = 1.37 \times 10^{-4} = 1.4 \times 10^{-4}$

Question 146.

The values of K_sp of $CaCO_3$ and CaC_2O_4 are 4.7×10^{-9} and 1.3×10^{-9} respectively at 25°C. If the mixture of these salts is washed with water, what is the c

(A) 3.606×10^{-5} M

(B) 6.856×10^{-5} M

(C) 7.746×10^{-5} M

(D) 5.831×10^{-5} M

Explanation:

$CaCO_3$ (x) $\rightarrow Ca^{2+} + CO_3^{2-}$ (x)

$CaC_2O_4 \rightarrow Ca^{2+}$ (Y) + $C_2O_4^{2-}$ (Y)

$\therefore [Ca^{2+}] = x + y$

Now, $K_{sp}(CaCO_3) = [Ca^{2+}][CO_3^{2-}]$

or ,$4.7 \times 10^{-9} = (x + y)x$

Similarly, $K_{sp}(CaC_2O_4) = [Ca^{2+}][C_2O_4^{2-}]$

or $1.3 \times 10^{-9} = (x + y)y$

On solving, we get

$[Ca^{2+}] = 7.746 \times 10^{-5}$ M

Question 147.

The dissociation constant of a weak acid is 1×10^{-4}. In order to prepare a buffer solution with a pH = 5, the [Salt]/[Acid] ratio should be

(A) 5: 4

(B) 4: 5

(C) 10 : 1

(D) 1 : 10

Explanation:

Given, $K_a = 1 \times 10^{-4}$
$\therefore pK_a = -\log(1 \times 10^{-4}) = 4$
Now from Henderson equation,
$pH = pK_a + \log([Salt]/[Acid])$
Putting the values,
$5 = 4 + \log([Salt]/[Acid])$
$\log([Salt]/[Acid]) = 5 - 4 = 1$
Taking antilog,
$[Salt]/[Acid] = 10 = 10 : 1$

Question 148.

In Castner-Kellner cell for production of sodium hydroxide:

(A) Brine is electrolyzed with Pt electrodes

(B) Molten sodium chloride is electrolyzed

(C) Sodium amalgam is formed at mercury cathode

(D) Brine is electrolyzed using graphite electrodes

Explanation:

In Castner-Kellner cell, sodium amalgam is formed at mercury cathode.

Question 149.

Which statement is wrong?

(A) Mg_2SiO_4 is an orthosilicate

(B) Basicstructural unit in silicates is the SiO_4 , tetrahedron

(C) Beryl is an example of cyclic silicate

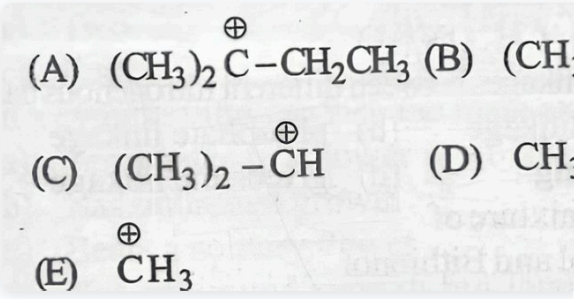
(D) Feldspar is not aluminosilicate

Explanation:

Feldspars are 3-dimensional alumino-silicates.

Question 150.

Arrange the following in increasing order of stability



(A) E

(B) E

(C) D

(D) A

Explanation:

Greater the number of e^-donating alkyl groups (+I effect), greater will be the stability of carbocations.

Question 151.

Homolytic fission of the following alkanes forms free radicals $CH_3 – CH_3$, $CH_3 – CH_2 – CH_3$, $(CH_3)_2CH – CH_3$, $CH_3 – CH_2 – CH(CH_3)_2$. Increasing order of stab

(A) $CH_3 – \dot{C}H_2 < CH_3 – \dot{C}H – CH_3 < (CH_3)_3\dot{C} – CH_3CH_2 < (CH_3)_2\dot{C}$ -- CH_2CH_3

(B) $CH_3 – \dot{C}H_2 < CH_3 – \dot{C}H – CH_3 < (CH_3)_2\dot{C} – CH_2$ - $CH_3 < (CH_3)_3\dot{C}$

(C) $(CH_3)_3\dot{C} < (CH_3)_2\dot{C} – CH_2CH_3 < CH_3 – \dot{C}H – CH_3 < CH_3 – \dot{C}H_2$

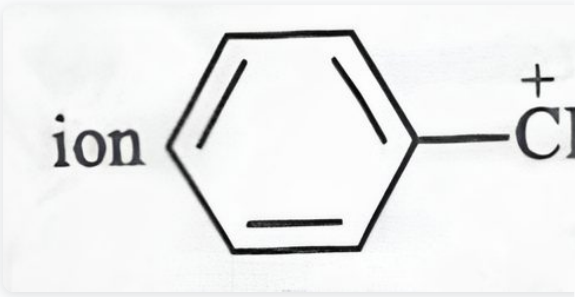
(D) $(CH_3)_2\dot{C} – CH_2CH_3 < CH_3 – \dot{C}H – CH_3 < CH_3 – \dot{C}H_2 < (CH_3)_3\dot{C}$

Explanation:

Stability depends on number of hyper conjugative structure.

Question 152.

What is the hybridisation state of benzyl carbonium



(A) sp^2d

(B) sp^2

(C) spd^2

(D) sp^3

Explanation:

In the carbonium ion the carbon atom carrying the positive charge is sp^2 hybridized.

Question 153.

Nitrogen detection in an organic compound is carried out by Lassaigne's test. The blue colour formed corresponds to which of the following formulae?

(A) $Fe_3[Fe(CN)_6]_3$

(B) $Fe_3[Fe(CN)_6]_2$

(C) $Fe_4[Fe(CN)_6]_2$

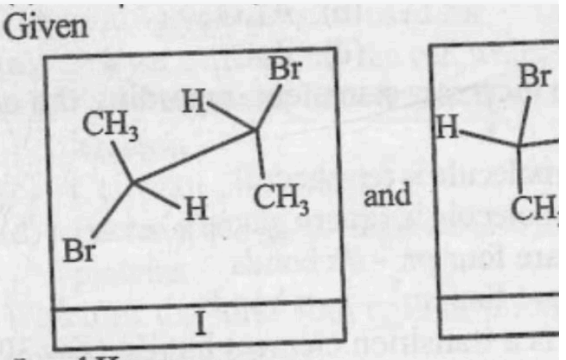
(D) $Fe_4[Fe(CN)_6]_3$

Explanation:

The prussian blue colour is of $Fe_4[Fe(CN)_6]_3$ ferrie ferrocyanide

Question 154.

Given



I and II are

(A) A pair of geometrical isomers

(B) A pair of conformers

(C) Identical

(D) A pair of optical isomers

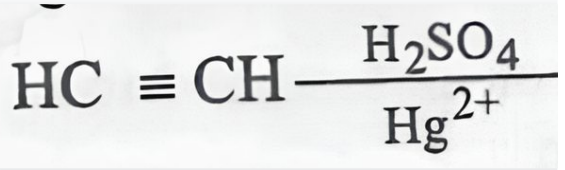
Explanation:

Conformers are form of stereoisomers in which isomers can be interconverted by rotation about single bonds. I and II are staggered and eclipsed conformers r

Question 155.

In the following reaction :

Product 'P' will not give



(A) Victory Meyer test

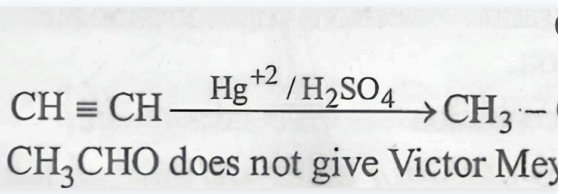
(B) Brady's reagent test

(C) Tollen's reagent test

(D) lodoform test

Explanation:

Conformers are form of stereoisomers in which isomers can be interconverted by rotation about single bonds. I and II are staggered and eclipsed conformers r



Question 156.

Which of the following chemical system is non aromatic?

(A)



(B)



(C)



(D)



Explanation:

Huckel ruleis ot obeyed. Ithas only four electrons . further it does not have continous conjugation.

Question 157.

Which one of the following statements is not true?

(A) 'When the pH of rain water is higher than 6.5, it is called acid rain.

(B) Fluoride deficiency in drinking water is harmful. Soluble fluoride is often used to bring its concentration upto 1ppm.

(C) Clean water would have a BOD value of 5 ppm.

(D) Dissolved oxygen (DO) in cold water can reach a concentration upto 10 ppm.

Explanation:

Acid rain is the rain water containing sulphuric acid and nitric acid which are formed from the oxides of sulphur and nitrogen present in the air as pollutants. Ra

below 5.6.

Question 158.

How many grams of cobalt metal will be deposited when a solution of cobalt (II) chloride is electrolyzed with a current of 10 amperes for 109 minutes (1 Farada

(A) 4.0

(B) 0.66

(C) 20.0

(D) 40.0

Explanation:

Applying,
w = Zit = Eit/96500
Equivalent weight of cobalt (II) = 59/2
I = 10 A
Time (t) = 109 min = 109 × 60 sec
Substituting these values we get,
w = (59 × 10 × 109 × 60) / (2 × 96500) = 20.0

Question 159.

Consider the half-cell reduction reaction: $Mn^{2+} + 2e^- \rightarrow Mn$, $E° = -1.18$ V $Mn^{2+} \rightarrow Mn^{3+} + e^-$, $E° = -1.51$ V The $E°$ for the reaction $3Mn^{2+} \rightarrow Mn^0 + 2Mn^{3+}$, and

(A) -2.69 V and no

(B) —4.18 V and yes

(C) +0.33 V and yes

(D) +2.69 V and no

Explanation:

$\Delta E^\circ = E^\circ_{red} + E^\circ_{oxd} = -1.81 - 1.51 = -2.69$

Since ΔE° is negative,

$\therefore \Delta G = -nF E^\circ$, ΔG will have positive value, so forward reaction is not possible.

Question 160.

A reaction is 50% completed in 2 hours and 75% completed in 4 hours. The order of

(A) 0

(B) 1

(C) 2

(D) 3

Explanation:

For a first order reaction,

$t_{75}\% = 2 \times t_{50}\%$

Question 161.

For a reaction between A and B the order with respect to A is 2and the order with respect to Bis 3. The concentrations of both A and B are doubled, the rate wil

(A) 32

(B) 16

(C) 10

(D) 12

Explanation:

$Rate_1 = k[A]^2[B]^3$
When concentrations of both A and B are doubled then,
$Rate_2 = k[2A]^2[2B]^3 = 32k[A]^2[B]^3$
$\therefore$ Rate will increase by a factor of 32.

Question 162.

The metal oxide which cannot be reduced to metal by

carbon is

(A) Fe_2O_3

(B) Al_2O_3

(C) PbO

(D) ZnO

Explanation:

Al_2O_3 cannot be reduced by carbon.

Question 163.

Identify the incorrect statement, regarding the molecule XeO_4:

(A) XeO_4 molecule is tetrahedral

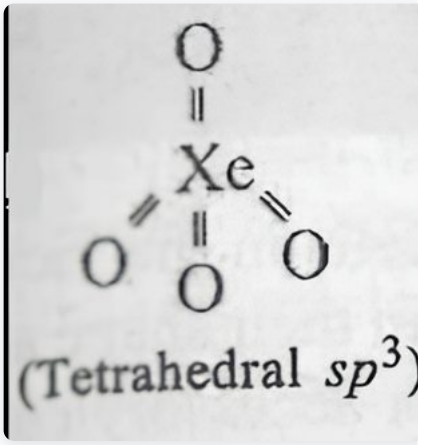
(B) XeO_4 molecule is square planar

(C) There are four sp^3–pσ bonds

(D) There are four pπ–dπ bonds

Explanation:

Al_2O_3 cannot be reduced by carbon.



Question 164.

Sc (Z = 21) is a transition element but Zn (Z = 30) is not because

(A) last electron is assumed to be added to 4s level in case of Zn

(B) both Sc^{3+} and Zn^{2+} ions are colourless and form white compounds

(C) both Sc and Zn do not exhibit variable oxidation states

(D) in case of Sc, 3d orbitals are partially filled but in Zn these are completely filled

Explanation:

A transition element must have incomplete d-subshell Zinc have completely filled d subshell having $3d^{10}$ configuration. Hence do not show properties of transit

Question 165.

Gadolinium belongs to 4f series. Its atomic number is 64. Which of the following is the correct electronic configuration of gadolinium?

(A) $[Xe]4f^8 6d^2$

(B) $[Xe]4f^9 5s^1$

(C) $[Xe]4f^7 5d^1\ 6s^2$

(D) $[Xe]4f^{\ 6}\ 5^5 d^2 6s^2$

Explanation:

Gd (64) = $[Xe]4f^7\ 5d^1\ 6s^2$

Question 166.

In a cymose inflorescence the main axis

(A) Has unlimited growth but lateral branches end in flowers

(B) Bears a solitary flower

(C) Has unlimited growth

(D) Terminates in a flower

Explanation:

In cymose inflorescence, the growth of the main axis is definite because the growing point of peduncle is used up in the formation of a flower. Further growth o

Question 167.

The correct IUPAC name for $[CrF_2(en)_2]Cl$ is:

(A) Chlorodifluoridobis (ethylene diamine) chromium (III)

(B) Chlorodifluoridoethy lenediaminechromium (III) chloride

(C) Difluorobis-(ethylene diamine) chromium (III) chloride

(D) Difluoridobis (ethylene diamine) chromium (III) chloride

Explanation:

IUPAC name of $[CrF_2(en)_2]Cl$ is
Difluorobis(ethylenediamine) chromium (III) chloride

Question 168.

In a particular isomer of $[Co(NH_3)_4Cl_2]^{o}$, the Cl–Co–Cl angle is 90°.

the isomer is known as .

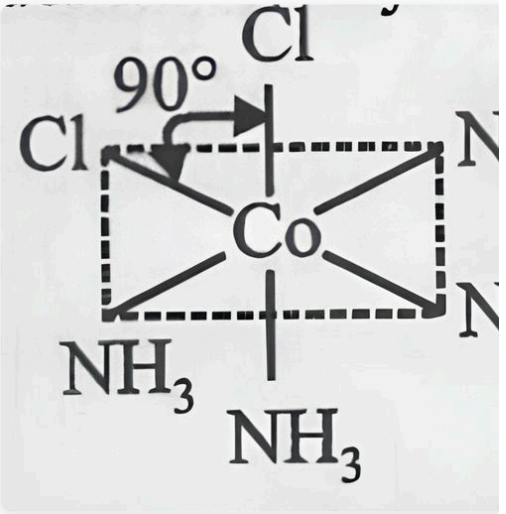
(A) Position isomer

(B) cis-isomer

(C) Optical isomer

(D) Linkage isomer

Explanation:



Question 169.

Which is diamagnetic?

(A) $[Fe(CN)_6]^{3-}$

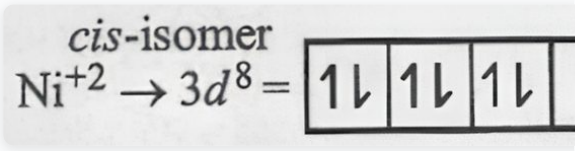
(B) $[Co(F_6)]^{3-}$

(C) $[NiCl_4]^{2-}$

(D) $[Ni(CN)_4]^{2-}$

Explanation:

CN^- is a strong ligand and causes pairing of 3d electrons of Ni^{2+}.
∴ It is diamagnetic.



Question 170.

The anion of acetylacetone (acac) forms $Co(acac)_3$ chelate with Co^{3+}. The rings of the chelate are

(A) three membered

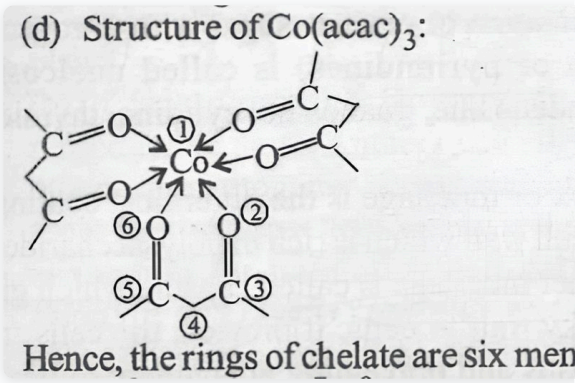
(B) five membered

(C) six membered

(D) four membered

Explanation:

CN^- is a strong ligand and causes pairing of 3d electrons of Ni^{2+}.
∴ It is diamagnetic.



Question 171.

Which among the following is a paramagnetic complex?

(At. No. of Mo = 42, Pt = 78)

(A) $[Mo(CO)_6]$

(B) $[Co(NH_3)_6]^{3+}$

(C) $[Pt(en)Cl_2]$

(D) $[CoBr_4]^{2-}$

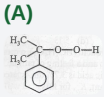
Explanation:

$Co^{2+} \Rightarrow [Ar]3d^7 4s^0$, here, Br^- is a weak field ligand so will not cause pairing of d-electrons in Co^{2+}.
∴ $[CoBr_4]^{2-}$ will exhibit paramagnetic behaviour due to unpaired electrons.

Question 172.

Phenol is distilled with Zn dust followed by Friedel Crafts alkylation with propyl chloride in the presence of $AlCl_3$ to give a compound (B). (B) is oxidised in the p

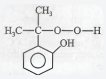
(A)



(B)



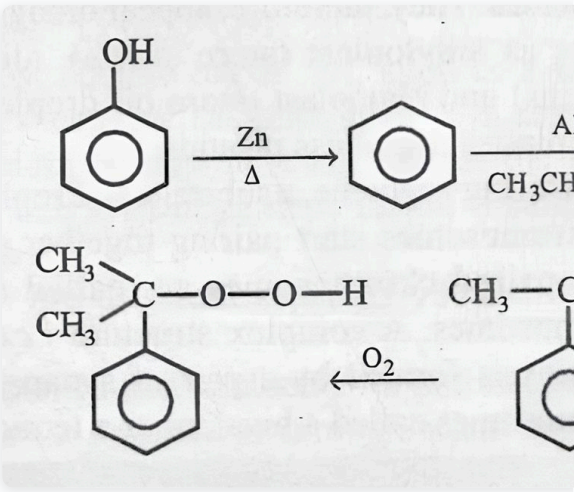
(C)



(D)



Explanation:



Question 173.

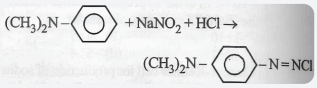
Some reactions of amines are given. Which one is correct ?

(A) $(CH_3)_2NH + NaNO_2 + HCl \rightarrow (CH_3)_2N–N=O$

(B) $CH_3NH_2 + C_6H_5SO_2Cl \rightarrow CH_3NHSO_2C_6H_5$

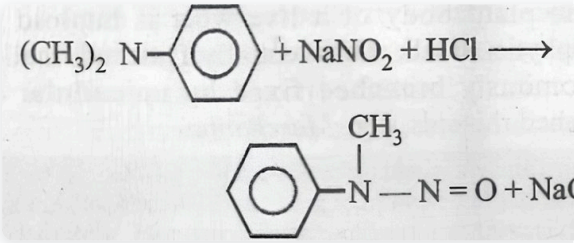
(C) $CH_3CH_2NH_2 + HNO_2 \rightarrow CH_3CH_2OH + N_2$

(D)



Explanation:

Secondary amine react with nitrous acid to give N-Nitrosoamines.



Question 174.

On hydrolysis of a “compound”, two compounds are obtained. One of which on treatment with sodium nitrite and hydrochloric acid gives a product which does

(A) $CH_3CH_2CH_2ON=O$

(B) $CH_3CH_2CH_2CN$

(C) $CH_3CH_2CH_2NC$

(D) $CH_3CH_2CH_2CON(CH_3)_2$

Explanation:

Hydrolysis of propyl isocyanide ($CH_3CH_2CH_2NC$) gives
$CH_3CH_2CH_2NH_2$ + HCOOH
On treatment with $NaNO_2$ and HCl, I gives $CH_3CH_2CH_2OH$ which does not give iodoform test. II (HCOOH) reduces Tollens' reagent and Fehling's solution.
$CH_3CH_2CH_2NC$ (Propyl isocyanide) + ---H_2O →

$CH_3CH_2CH_2NH_2$ (I)+ HCOOH (II)

Question 175.

In DNA, the linkages between different nitrogenous bases are :

(A) peptide linkage

(B) phosphate linkage

(C) glycosidic linkage

(D) H-bonding

Explanation:

The base pairs of the two strands of DNA are linked together through H-bonds.

Question 176.

Dettol is the mixture of

(A) Chloroxylenol and Terpineol

(B) Chloroxylenol and Bithionol

(C) Phenol and Iodine

(D) Terpineol and Bithionol

Explanation:

Dettol is a mixture of chloroxylenol and terpineol.

Question 177.

Which condition is not satisfied by an ideal solution?

(A) Obeysance to Raoult's Law

(B) Δ_mix H = 0

(C) Δ_mix V = 0

(D) Δ_mix S = 0

Explanation:

An ideal solution is that solution in which. each component obeys Raoult's law under all conditions of temperatures and concentrations. For an ideal solution.

ΔH_mix = 0 and ΔV_mix = 0..

Question 178.

The outer electronic configuration of Gd (At. No. 64) is:

(A) $4f^4\ 5d^5\ 6s^1$

(B) $4f^5\ 5d^4\ 6s^1$

(C) $4f^7\ 5d^1\ 6s^2$

(D) $4f^8\ 5d^5\ 6s^2$

Explanation:

Gd [64] = $[Xe]4f^7 5d^1 6s^2$

Question 179.

Number of isomeric alcohols of molecular formula $C_6H_{14}O$ which give positive iodoform test is

(A) three

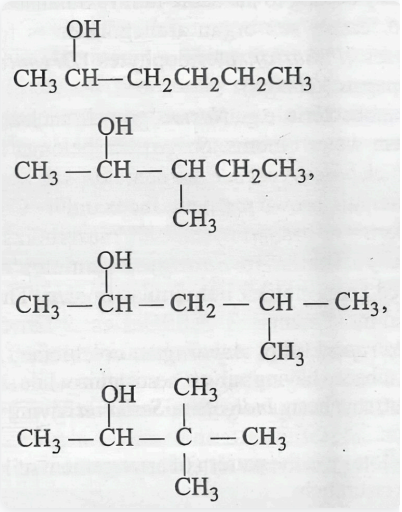
(B) four

(C) five

(D) two

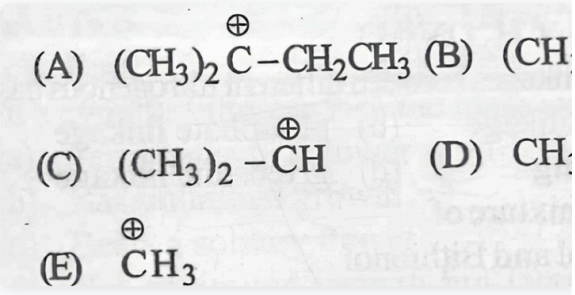
Explanation:

Gd [64] = $[Xe]4f^7 5d^1 6s^2$



Question 180.

Arrange the following in increasing order of stability



(A) E

(B) E

(C) A

(D) D

Explanation:

Greater the number of e ¯donating alkyl groups (+I effect),greater will be the stability of carbocations