30/08/2022
SLOT-02

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Answers & Solutions

for

CUET UG-2022

(BIOLOGY)

Time : 3 hrs. M.M. : 200

IMPORTANT INSTRUCTIONS:

(1) The test is of 45 Minutes duration.

(2) The test contains 50 Questions out of which 40 questions need to be attempted.

(3) Marking Scheme of the test:

a. Correct answer or the most appropriate answer: Five marks (+5)

b. Any incorrect option marked will be given minus one mark (–1).

c. Unanswered/Marked for Review will be given no mark (0).

BIOLOGY

Choose the correct answer:

Question ID: 682601

Match List I with List II

	LIST I		LIST II
A.	Monoecious Plants	I.	Date palm
B.	Unisexual	II.	Leach
C.	Hermaphrodites	III.	Cucurbita
D.	Dioecious Plants	IV.	Cockroach

Choose the correct answer from the options given below:

(A) A-III, B-IV, C-I, D-II (B) A-III, B-IV, C-II, D-I

(C) A-I, B-IV, C-II, D-III (D) A-I, B-IV, C-III, D-II

Answer (B)

Sol. Plants bearing both male and female sex organs on the same body are called monoecious plants, e.g. *Cucurbita, Zea mays*, etc.

Plants bearing only one of the sex organs i.e. either male or female, are called Dioecious plants, e.g. Papaya, Date palm, etc.

Unisexual animals have either male or female sex organ on single body. e.g. Cockroach, *Ascaris*, etc.

Hermaphrodites are bisexual animals such as Leach, Earthworm, etc.

So, A-(III), B-(IV), C-(II), D-(I)

Question ID: 682602

Match List I with List II

	LIST I		LIST II
A.	Physical barrier	I.	Interferons
B.	Cellular barrier	II.	Natural Killer cells
C.	Physiological barrier	III.	Tears from eyes
D.	Cytokine barrier	IV.	Skin

Choose the correct answer from the options given below:

(A) A-I, B-IV, C-III, D-II (B) A-II, B-I, C-IV, D-III

(C) A-III, B-IV, C-I, D-II (D) A-IV, B-II, C-III, D-I

Answer (D)

Sol. Option (D) is the correct answer because skin in our body is the main physical barrier which prevents entry of the micro-organisms.

Natural killer cells are the cellular barriers of innate immunity.

Tears from eyes comes under the category of physiological barriers.

Virus infected cells secrete proteins called interferons which protect non-infected cells from further viral infection. It comes under cytokine barrier.

Question ID: 682603

A couple is unable to produce a child as the male partner has low sperm count. Infertility caused by this condition can be treated using

(A) ZIFT (B) AI

(C) GIFT (D) IUT

Answer (B)

Sol. Option (B) is the correct answer as infertility cases either due to inability of the male partner to inseminate the female or due to very low sperm count in the ejaculate, could be corrected by artificial insemination.

After IVF, the zygote or early embryo (upto 8 blastomeres) could then be transferred into the fallopian tube *i.e*. ZIFT and embryo with more than 8 blastomeres is transferred into the uterus (IUT).

Option (C) is not the answer as GIFT stands for Gamete Intra Fallopian Transfer.

Question ID: 682604

Which of these are the carriers of male gametes in some seed plants?

(A) Microspore mother cells

(B) Pollen Grains

(C) Anthers

(D) Megaspore mother cells

Answer (B)

Sol. Pollen grains represent male gametophyte in seed plants. It carries the male gametes which can be transferred to the female gamete via pollination.

Question ID: 682605

Match List I with List II

	LIST I		LIST II
A.	Malaria	I.	*Salmonella*
B.	Pneumonia	II.	*Wuchereria*
C.	Typhoid	III.	*Haemophilus*
D.	Filariasis	IV.	*Plasmodium*

Choose the correct answer from the options given below:

(A) A-I, B-II, C-IV, D- III (B) A-IV, B-III, C-I, D-II

(C) A-III, B-II, C-I, D-IV (D) A-II, B-IV, C-I, D-III

Answer (B)

Sol. Option (B) is the correct answer as the causative agents of malaria, pneumonia, typhoid and filariasis are *Plasmodium* (protozoa), *Haemophilus* (bacteria), *Salmonella typhi* (bacteria) and *Wuchereria* (nematode) respectively.

Question ID: 682606

Arrange the following steps in order for the technique of DNA finger printing.

A. Isolation of DNA.

B. Separation of DNA fragments by gel, electrophoresis.

C. Digestion of DNA by restriction endonucleases.

D. Blotting of separated DNA fragments to nylon membrane.

E. Hybridisation using VNTR probe followed by autoradiography.

Choose the correct answer from the options given below:

(A) A,C,B,D,E (B) A,B,C,D,E

(C) A,B,D,C,E (D) A,E,C,B,D

Answer (A)

Sol. DNA fingerprinting involves following steps-

A. Isolation of DNA.

C. Digestion of DNA by restriction endonucleases.

B. Separation of DNA fragments by gel electrophoresis.

D. Blotting of separated DNA fragments to nylon membrane.

E. Hybridisation using VNTR probe followed by autoradiography.

So the correct order is A,C,B,D,E.

Question ID: 682607

Long term use of alcohol specially causes-

(A) Liver cirrhosis

(B) Arthrities

(C) Pulmonary system damage

(D) Premature baldness

Answer (A)

Sol. Option (A) is the correct answer because the chronic use of drugs and alcohol damages nervous system and liver (alcoholic cirrhosis).

Option (B) is not the answer as, arthritis is defined as the inflammation of joints.

Option (C) is not the answer as pulmonary system damage is associated with smoking tobacco or other forms of air pollutants.

Option (D) is not the answer as premature baldness can occur due to deficiency of biotin or growth hormone deficiency.

Question ID: 682608

Select the appropriate options with reference to post fertilisation changes in angiosperms.

A. Inner integument of ovule develops into tegmen.

B. Ovary wall forms pericarp

C. Ovule forms fruit

D. Zygote forms endosperm

E. Outer integument of ovule develops into Testa

Choose the correct answer from the options given below:

(A) B, E only (B) A, B, E only

(C) C, D, B only (D) A, C, B only

Answer (B)

Sol. Post fertilization events in angiosperms include-

- Formation of endosperm from primary endosperm cell.
- Formation of embryo from zygote
- Formation of seed from ovule
- During seed formation, integuments develops into seed coats. Outer integument forms testa (outer seed coat) while inner integument forms tegmen (inner seed coat).
- Formation of pericarp from ovary wall.

Question ID: 682609

The part of the human sperm that helps in the fertilisation of the ovum is a cap-like structure called

(A) Head

(B) Acrosome

(C) Middle piece

(D) Tail

Answer (B)

Sol. Option (B) is the correct answer as, the acrosome is a cap-like structure filled with hydrolytic enzymes which help in fertilisation of ovum.

Option (A) is not the correct answer as sperm head contains an elongated nucleus and acrosome.

Option (C) is not the correct answer as middle piece possesses numerous mitochondria which produce energy for sperm motility.

Option (D) is not the correct answer as this helps in the movement of sperms.

Question ID: 6826010

Rearrange the events of life cycle of a retrovirus.

A. New viral RNA produced by infected cell

B. Reverse transcription

C. New virus particles inject into other cells

D. Viral RNA introduced into the cell

E. Viral DNA incorporates into host genome

Choose the correct answer from the options given below:

(A) A, B, D, E, C

(B) B, E, D, A, C

(C) C, A, B, D, E

(D) D, B, E, A, C

Answer (D)

Sol. Option (D) is correct answer because the steps for HIV in host is as follows:

D – Viral RNA is introduced into the cell.

B – Enzyme reverse transcriptase acts on viral RNA.

E – Viral DNA produced is incorporated into the host genome.

A – New viral RNA is produced by infected cell.

C – New virus particles inject into other cells.

Question ID: 6826011

Secondary treatment of sewage involves

(A) Physical removal of large and small particles from sewage through filtration

(B) Anaerobic sludge digestion

(C) Sedimentation to remove smaller and larger particles

(D) Mechanical agitation coupled with addition of aerobic microbes

Answer (D)

Sol. Sewage treatment consists of two stages-

1. Primary treatment - Removes particles through filtration and sedimentation
2. Secondary treatment/ Biological treatment- Primary effluent is treated with aerobic microbes in an aerobic tank. During the process the medium is agitated continuously for proper mixing and aeration.

Once the organic content is degraded mostly, the effluent is allowed to sediment in settling tank where the sediment formed is called Activated sludge.

Question ID: 6826012

Given below two statements: one is labelled as assertion A and the other is labelled as Reason R

Assertion A: In F_2 generation of a Mendelian cross, the traits seen in the progeny are identical to their parents.

Reason R: The progeny of the F_2 generation in a Mendelian cross shows no blending of traits.

In the light of the above statements, chose the most appropriate answer from the options given below:

(A) Both A and R are correct and R is the correct explanation of A

(B) Both A and R are correct but R is NOT the correct explanation of A

(C) A is correct but R is not correct

(D) A is not correct but R is correct

Answer (A)

Sol. In monohybrid Mendelian cross, F_1 generation shows phenotype of only one parent while F_2 generation has progenies expressing phenotype of both parents.

This observation was possible because there is no blending of traits occur. This also led to the

conclusion that traits are governed by discrete units.

Both A and R are correct and R is the correct explanation of A.

Question ID: 6826013

In flowering plants, the egg apparatus consists of:

(A) Three antipodals and one egg cell

(B) Two synergids and one central cell

(C) Two synergids and one egg cell

(D) Three antipodals and two synergids

Answer (C)

Sol. Embryo sac, the female gametophyte of angiosperm is 8-nuceated 7-celled. It includes–

1. Egg apparatus $\rightarrow$ with one egg and two synergids
2. Central cell with 2 polar nuclei
3. Three antipodals

Question ID: 6826014

Layers surrounding the ovum from outside to inside are

A. Zona pellucida

B. Vitelline membrane

C. Corona radiata

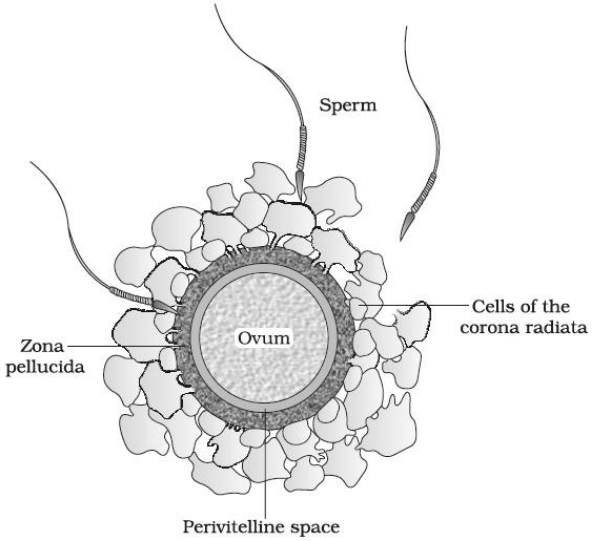
Choose the correct answer from the options given below :

(A) A, C, B (B) C, B, A

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

Answer (C)

Sol. Option (C) is the correct answer, because



Question ID: 6826015

The term ribosome is applicable to the following molecule in bacteria

(A) mRNA

(B) 23S rRNA

(C) 5S rRNA

(D) hn RNA

Answer (B)

Sol. In prokaryotes, the larger subunit of ribosome consists of 23S and 5S rRNA. In eukaryotes, the larger subunit of ribosome has 28S, 5.8S and 5S rRNA. Hence term ribosome is applicable to 23S rRNA in bacteria.

mRNA is synthesised by transcription in both prokaryotes and eukaryotes.

hnRNA is the precursor of mRNA in eukaryotes.

Question ID: 6826016

Match List I with List II

	LIST I		LIST II
A.	Homo habilis	I.	Used hides to protect their body and buried their dead
B.	Dryopithecus	II.	Hunted with stone weapons but essentially ate fruits
C.	Australopithecines	III.	First human-like being
D.	Neanderthal man	IV.	Ape-like ancestor

Choose the correct answer from the options given below:

(A) A - I, B - II, C - III, D - IV

(B) A - III, B - IV, C - II, D - I

(C) A - IV, B - III, C - I, D - II

(D) A - II, B - I, C - IV, D - III

Answer (B)

Sol. Option B is the correct answer as

- *Homo habilis* were the first human-like being the hominid.
- *Dryopithecus* were existing about 15 mya and they were more ape-like.

- *Australopithecines* hunted with stone weapons but essentially ate fruits.
- *Neanderthal* man used hides to product their body and buried their dead.

Question ID: 6826017

After an HIV infection, the body of the patient starts becoming immunodeficient mainly due to :

(A) The damage caused to secondary lymphoid organs

(B) Rapid multiplication of the virus outside the host cells

(C) Progressive decline in the number of helper T-lymphocytes

(D) Infection by a number of pathogens

Answer (C)

Sol. Option C is the correct answer as

T-helper cells stimulate B-cells to produce antibodies and induce killer-T-cells to destroy the non-self cells (foreign cells).

In HIV infection, due to decrease in the number of helper T-cells, the person starts suffering from opportunistic infections due to decrease in immunity.

Question ID: 6826018

Bioactive molecules like statins are produced by :

(A) Trichoderma polysporum

(B) Monascus purpureus

(C) Acetobacter aceti

(D) Streptococcus

Answer (B)

Sol. Bioactive molecules like statins are produced by the yeast *Monascus purpureus*.

Trichoderma polysporum produces an immunosuppressive agent cyclosporin A.

Acetobacter aceti produces acetic acid.

Streptococcus produces the clot buster enzyme streptokinase.

Question ID: 6826019

The haplodiploid sex-determination system where all the males of the population are haploid and females are diploid, is seen in

(A) Drosophila (B) Honey bees

(C) Birds (D) Grasshoppers

Answer (B)

Sol. The haplo-diploid sex determination system is seen in honey bees. In honeybee males have half the number of chromosomes than that of females.

In *Drosophila* and grasshopper, male heterogamety is seen.

In birds, female heterogamety is seen.

Question ID: 6826020

Match List I with List II

	LIST I		**LIST II**
A.	Genetic drift	I.	Change in allele frequency due to immigration and emigration
B.	Stabilising selection	II.	Change in gene frequency due to chance factor
C.	Gene flow	III.	More individuals acquire mean character value
D.	Saltation	IV.	Single step large mutation

Choose the correct answer from the options given below:

(A) A - I, B – II, C - III, D - IV
(B) A - III, B - 1, C - II, D - IV
(C) A - I, B - III, C - IV, D - II
(D) A - II, B - III, C - I, D - IV

Answer (D)

Sol. Option (D) is the correct answer because

- Genetic drift is defined as sudden change in gene frequency by chance.
- In stabilising selection, more individuals acquire mean character value.
- Gene flow is the change in allele frequency due to immigration and emigration.
- Saltation is the single step large mutation.

Question ID: 68260121

Match List I with List II

	LIST I		LIST II
A.	Cowpea	I.	Tobacco mosaic virus
B.	Chilli	II.	Leaf and stripe rust
C.	Brassica	III.	Bacterial blight
D.	Wheat	IV.	White rust

Choose the correct answer from the options given below:

(A) A - II, B - III, C - IV, D - I

(B) A - I, B - II, C - III, D - IV

(C) A - III, B - I, C - IV, D - II

(D) A - IV, B - II, C - III, D - I

Answer (C)

Sol. The crop bred by hybridisation and selection for particular disease resistance are as follows

Cowpea – Bacterial blight

Chilli – Tobacco mosaic virus

Brassica – White rust

Wheat – Leaf and stripe rust

Therefore, the correct answer is option C

Question ID: 6826022

What happened when heat-killed S cells along with live R cells were injected into mice in Griffith's experiment?

(A) Mice died and showed live R cells in the blood

(B) Mice survived and showed live S cells in the blood

(C) Mice died and showed live S cells in the blood

(D) Mice survived and showed live R cells in the blood

Answer (C)

Sol. When Griffith injected a mixture of heat-killed S cells and live R cells, the mice died. Moreover, he recovered living S-bacteria from the dead mice. He concluded that the R-strain bacteria had somehow been transformed by the heat-killed S-strain bacteria.

Question ID: 6826023

Autotrophic microbe for fixing atmospheric nitrogen:

(A) Rhizobium (B) Aspergillus

(C) Oscillatoria (D) Trichoderma

Answer (C)

Sol. Cyanobacteria are autotrophic microbes widely distributed in aquatic and terrestrial environment many of which can fix atmospheric nitrogen.

e.g. *Anabaena*, *Nostoc*, *Oscillatoria*

Trichoderma and *Aspergillus* are fungi

Rhizobium is heterotrophic bacteria, as symbiont, can fix atmospheric nitrogen.

Question ID: 6826024

In humans females at the time of birth, the stage of cell cycle of oocyte is

(A) Prophase-I (B) Prophase-II

(C) Meiosis-II (D) Mitosis

Answer (A)

Sol. Option (A) is the correct answer because oogonia start division during fetal life and enter into prophase-I of the meiotic division and get temporarily arrested at that stage called primary oocytes. So, at the time of birth, the stage of cell cycle of oocyte is prophase-I.

Question ID: 6826025

Calotropis, a weed growing in abandoned fields, produces one of the following biochemicals as a defense against grazers and browsers-

(A) Nicotine (B) Opium

(C) Cardiac glycosides (D) Strychnine

Answer (C)

Sol. *Calotropis*, a weed growing in abandoned field produces highly poisonous cardiac glycosides as a defense against grazers and browsers.

Question ID: 6826026

Calculate the birth rate if there were 60 sparrows in a garden last year and through reproduction 24 new sparrows are added this year

(A) 0.4 offsprings per sparrow per year

(B) 0.2 offsprings per sparrow per year

(C) 0.6 offsprings per sparrow per year

(D) 0.1 offsprings per sparrow per year

Answer (A)

Sol. Birth rate = $\frac{\Delta N}{N\Delta t} = \frac{24}{60} = 0.4$.

$\therefore$ If there were 60 sparrows in a garden last year and through reproduction 24 new sparrows are added this year, then birth rate is 0.4 offspring per sparrow per year.

Question ID: 6826027

Totipotency can be defined as

(A) Capacity to generate whole plant from any cell/explant

(B) Capacity to survive in unfavourable environment condition

(C) Ability to conduct water in 100 meter tall tree

(D) The duration of dormancy of seeds and other propagules in angiosperms

Answer (A)

Sol. The capacity to generate whole plant from any cell/explant is called totipotency.

Question ID: 6826028

Match List I with List II

LIST I		LIST II	
A.	Fig and wasp	I.	Competition
B.	Koel and crow	II.	Commensalism
C.	Balanus and Chathamalus	III.	Mutualism
D.	Egret and cattle	IV.	Brood parasitism

Choose the correct answer from the options given below

(A) A-III, B-IV, C-I, D-II (B) A-I, B-III, C-II, D-IV

(C) A-II, B-III, C-I, D-IV (D) A-III, B-II, C-I, D-IV

Answer (A)

Sol.
- Fig species can be pollinated only by its partner wasp species. So it shows mutual relationship.
- Koel and crow show brood parasitism in which parasitic bird lays its eggs in the nest of its host and let the host incubate them.
- *Balanus* dominates the intertidal areas and excludes the smaller barnacle *Chathamalus* from the zone so shows competition.
- The egret and grazing cattle shows commensalism. The egrets always forage close to where the cattle are grazing.

Question ID: 6826029

Match List I with List II

LIST I		LIST II	
A.	Sex-determination	I.	Vault
B.	Withdrawal	II.	Amniocentesis
C.	Barrier (physical)	III.	Syphilis
D.	Venereal diseases	IV.	Coitus interruptus

Choose the correct answer from the options given below:

(A) A-I, B-II, C-IV, D-III (B) A-II, B-I, C-IV, D-III

(C) A-II, B-IV, C-I, D-III (D) A-I, B-IV, C-II, D-III

Answer (C)

Sol. Option (C) is the correct answer because

- Sex determination is illegally done by amniocentesis so, there is ban on it in India.
- Withdrawal method of contraception is also known as coitus interrupts in which the male partner withdraws his penis from the vagina just before ejaculation.
- Vault is a barrier method of contraception.
- Syphilis is a venereal or sexually transmitted bacterial disease.

Question ID: 6826030

Restriction endonucleases are used as molecular ___

(A) molecular build up at nucleotides

(B) molecular cement to join DNA sites

(C) molecular knife cut DNA at specific site

(D) molecular degradation to break up the DNA to nucleotides

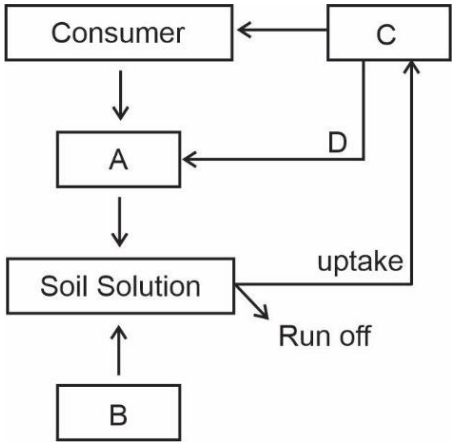
Answer (C)

Sol. Option (C) is the correct answer because restriction endonucleases are commonly known as molecular scissors. Each restriction endonuclease inspects the length of a DNA sequence, finds its specific palindromic nucleotide sequence and cut each of the two strands of the double helix at this specific points in their sugar-phosphate backbone.

DNA ligase works as molecular glue to join up the DNA segments.

Question ID: 6826031

Given below is a simplified model of phosphorus cycle in terrestrial ecosystem with four blanks. Identify the blanks A, B, C and D.



(A) A: Producer, B: Litter fall, C: Rock mineral, D: Detritus

(B) A: Rock minerals, B: Detritus, C: Litter fall, D: Producers

(C) A: Litter fall, B: Producer, C: Rock minerals, D: Detritus

(D) A: Detritus, B: Rock minerals, C: Producers, D: Litter fall

Answer (D)

Sol. In the given simplified model of phosphorus cycling in a terrestrial ecosystem, the following labels are

A – Detritus B – Rock minerals

C – Producers D – Litter fall

Question ID: 6826032

Match List I with List II

LIST I (Genes in lac operon)		**LIST II (Products coded for)**	
A.	i-gene	I.	β-galactosidase
B.	z-gene	II.	Transacetylase
C.	y-gene	III.	Repressor protein
D.	a-gene	IV.	Permease

Choose the correct answer from the options given below:

(A) A-I, B-II, C-IV, D-III (B) A-III, B-I, C-IV, D-II

(C) A-III, B-IV, C-II, D-I (D) A-I, B-II, C-III, D-IV

Answer (B)

Sol. The 'i' gene codes for the repressor protein of the lac operon.

The 'z' gene codes for beta galactosidase which is primarily responsible for hydrolysis of disaccharide.

The 'y' gene codes for pemease which increases permeability of the cell to β-galactosidase.

'a' gene encodes transacetylase.

So, A-III, B-I, C-IV, D-II.

Question ID: 6826033

Cohen and Boyer created the first recombinant DNA using plasmid of

(A) *Escherichia coli*

(B) *Thermus aquaticus*

(C) *Salmonella typhimurium*

(D) *Bacillus thuringiensis*

Answer (C)

Sol. Option (C) is the correct answer because Stanley Cohen and Herbert Boyer created the first recombinant DNA using a native plasmid of *Salmonella typhimurium*. This recombinant DNA was then transferred into *Escherichia coli*.

Thermus aquaticus is a thermostable bacterium whose enzymes are used in PCR.

*Bacillus thuringiensis*is is used to make Bt cotton (pest-resistant crop).

Question ID: 6826034

Match List I with List II

LIST I		**LIST II**	
A.	Catalytic converter	I.	Solid wastes
B.	Electrostatic precipitator	II.	High noise level
C.	Earmuffs	III.	Particulate matter
D.	Land fills	IV.	Carbon monoxide and nitrogen oxide

Choose the correct answer from the options given below:

(A) A-II, B-III, C-I, D-IV

(B) A-I, B-IV, C-III, D-II

(C) A-IV, B-III, C-II, D-I

(D) A-III, B-IV, C-II, D-I

Answer (C)

Sol.
- When exhaust passes through the catalytic converter, carbon monoxide and nitric oxide are changed to carbon dioxide and water.
- Electrostatic precipitator can remove over 99% particulate matter present in the exhaust from the thermal power plant.
- High noise level in an area is eliminated by using earmuffs
- Solid wastes are trashed in a depression or trench considered as landfills.

Question ID: 6826035

Identify the **correct** statements.

A. Oogenesis is initiated at puberty

B. Second meiotic division in secondary oocyte occurs in the ovary

C. Middle piece of sperm provides energy for movement

D. Fertilization of gametes occur in the ampulla isthmic region of oviduct

E. Myometrium helps in muscular contractions of the uterus

Choose the correct answer from the options given below:

(A) A, D, E only

(B) A, B, D only

(C) B, C, D only

(D) C, D, E only

Answer (D)

Sol. Option (D) is the correct answer because statements C, D and E are correct.

The middle piece of sperm possesses numerous mitochondria, which produce energy for the movement of tail.

Fertilisation can only occur if the ovum and sperms are transported simultaneously to the ampulla-isthmic region of oviduct.

The middle layer, myometrium exhibits strong uterine contractions during delivery of the baby.

Oogenesis is initiated during the embryonic development stage whereas spermatogenesis starts at the age of puberty.

2^{nd} meiotic division in secondary oocyte is completed in fallopian tube after entry of sperm into the ovum.

Question ID: 6826036

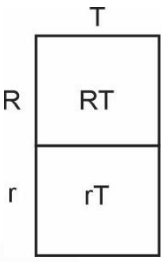
How many gametes will be formed in the pea plant having genotype RrTT?

(A) One (B) Two

(C) Four (D) Eight

Answer (B)

Sol. In a pea plant having genotype RrTT, two types of gametes will be formed i.e. RT and rT.



Question ID: 6826037

The detritus food chain (DFC) begins with

(A) Green plants

(B) Carnivore

(C) Dead Organic matter

(D) Herbivore

Answer (C)

Sol. Detritus food chain begins with detritus or dead organic matter.

Grazing food chain begins with green plants.

Carnivores feed on consumers.

Herbivores feed on green plants.

Question ID: 6826038

How many cycles in a PCR will be required for amplifying the genetic material to about one billion times?

(A) 10 cycles

(B) 15 cycles

(C) 30 cycles

(D) 35 cycles

Answer (C)

Sol. Option (C) is the correct answer because if the process of replication of DNA is repeated many times, the segment of DNA can be amplified to approximately billion times, *i.e.,* 1 billion copies are made at the end of 30 PCR cycles. It is possible to generate '2^n' DNA molecules after 'n' number of cycles.

Question ID: 6826039

Gene of which one of the following is present exclusively on the x-chromosome in human being

(A) Thalassemia

(B) Phenylketonuria

(C) Red and green colour blindness

(D) Sickle cell anaemia

Answer (C)

Sol. Red-green colour blindness is an X-linked recessive Mendelian disorder. Gene for this character is present on X-chromosome in humans.

Thalassemia, phenylketonuria and sickle cell anaemia are autosomal recessive Mendelian disorders.

Question ID: 6826040

Biofortification refers to

(A) Sources of proteins for animal and human nutrition

(B) Production of somatic hybrids

(C) Use of mutation breeding

(D) Breeding crops with higher levels of vitamins and minerals, or higher protein and healthier fat

Answer (D)

Sol. Breeding of crops with higher levels of vitamins and minerals or higher protein and healthier fats is called biofortification.

SCP is one of the sources of proteins for animal and human nutrition.

Somatic hybrids are produced by somatic hybridization.

Mutation breeding is one of the methods for making crops disease resistant.

CASE STUDY

Some strains of Bacillus thuringiensis produce protein that kill certain insects such as lepidopterans (tobacco budworm, armyworm), coleopterans (beetles) and dipterans (flies, mosquitoes). Bacillus thuringiensis forms protein crystals during a particular phase of their growth. These crystals contain a toxic insecticidal protein. The Bt toxin proteins exists as inactive protoxins but once an insect ingests the inactive toxin, it is converted into an active form due to alkaline pH of the gut which solubilise the crystals.

Question ID: 6826041

The Bt toxin acts on _____ of insect pest

(A) Hind gut

(B) Nervous system

(C) Reproductive system

(D) Midgut

Answer (D)

Sol. Option (D) is the correct answer because the activated Bt toxins bind to the surface of midgut epithelial cells and create pores that cause cell swelling and lysis and eventually cause death of the insect.

Question ID: 6826042

Some strains of Bacillus thuringiensis produce proteins that kill certain insects such as

(A) Grasshoppers and mosquitoes

(B) Lepidopterans, coleopterans and dipterans

(C) Coleopterans and nematodes

(D) Meloidegyne incognitia

Answer (B)

Sol. Option (B) is the correct answer because some strains of *Bacillus thuringiensis* produce proteins that kill certain insects such as lepidopterans (tobacco budworm, armyworm), coleopterans (beetles) and dipterans (flies, mosquitoes).

Question ID: 6826043

B. thuringiensis forms protein crystals during a particular phase of their growth. These crystals contain a toxic.

(A) Proteolytic enzymes (B) Chitin

(C) Insecticidal protein (D) Flavoprotein

Answer (C)

Sol. Option (C) is the correct answer because *Bacillus thuringiensis* forms a toxic insecticidal protein during a particular phase of their growth. This protein kills the insects and leads to the development of pest-resistant crops.

Question ID: 6826044

Bt toxin exists as inactive protoxins, it is converted into an active form of toxin due to

(A) Enzymes in insect's gut

(B) Acidic pH of the insect's gut

(C) Binding with collagen in insect's gut

(D) Alkaline pH of the insect's gut

Answer (D)

Sol. Option (D) is the correct answer because the Bt toxin protein exists as inactive protoxins but once an insect ingests the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilises the crystals.

Question ID: 6826045

The proteins encoded by the genes cryIAc and cryIIAb control

(A) Corn borers

(B) Cotton bollworms

(C) Mosquitoes

(D) Nematodes

Answer (B)

Sol. Option (B) is the correct answer because the proteins encoded by the genes *cryIAc* and *cryIIAb* control the cotton bollworms, that of *cryIAb* controls corn borer.

PASSAGE

The biological wealth of our planet has been declining rapidly and the accusing finger is clearly pointing to human activities. The colonisation of tropical pacific islands by humans is said to have led to extinction of more than 2000 species of native birds. The IUCN red list documents the extinction of 784 species. Since the origin and diversification of life on earth, there were five episodes of mass extinction of species. Current species extinction rate as estimated to be 100-1000 times faster. There are four major causes called "The Evil quartet" Habitat loss, over exploitation, Alien species invasion and co-extinction. Conservation efforts are necessary to preserve biodiversity and protect endangered species and their habitats.

Question ID: 6826046

Tissue culture and cryopreservation are the techniques used

(A) In *in-situ* conservation

(B) To control conservation of medicinal plants only

(C) In *ex-situ* conservation method

(D) Used in conventional breeding programmes

Answer (C)

Sol. *Ex-situ* conservation method includes protective maintenance of threatened species in zoological parks and botanical gardens, *in-vitro* fertilization, tissue culture propagation and cryopreservation of gametes.

Question ID: 6826047

Mr. X wants to understand the 'Evil Quartet' to know the reasons of Biodiversity loss. It is

(A) Habitat loss and fragmentation only

(B) Over exploitation and Alien species invasions only

(C) Co-extinctions and Alien-species invasion

(D) Habitat loss, over exploitation, Alien species invasions and co-extinctions

Answer (D)

Sol. There are four major causes of biodiversity losses called 'The Evil Quartet'. These are habitat loss and fragmentation, over exploitation, alien species invasions and co-extinctions.

Question ID: 6826048

Which one of the following is NOT the reason for decline in biodiversity?

(A) Pollution (B) Agriculture

(C) Sacred groves (D) Fishing

Answer (C)

Sol. There are accelerated rates of decline in biodiversity largely due to human activities. Agriculture results in habitat loss and pollution makes the environment unfit for survival of species. One of the example of over-exploitation can be fishing that can lead to decline in biodiversity.

In sacred groves wildlife is given total protection.

Question ID: 6826049

Select the one which is NOT an *ex-situ* conservation of biodiversity

(A) Zoological parks (B) Botanical gardens

(C) National parks (D) Seed banks

Answer (C)

Sol. National parks are *in-situ* conservation strategies for the protection of species. Zoological parks, botanical gardens and seed banks are *ex-situ* conservation strategies for the protection of species.

Question ID: 6826050

Identify the *in-situ* ways to conserve biodiversity from the following

A. Zoological parks

B. Eggs fertilised *in-vitro*

C. Sacred groves

D. Biosphere reserves

Choose the correct answer from the options

(A) A, B only

(B) B, C only

(C) C, D only

(D) A, D only

Answer (C)

Sol. Sacred groves and biosphere reserve are *in-situ* conservation strategies for protection of biodiversity.

Zoological parks are *ex-situ* conservation strategies for biodiversity protection.

When the fertilization of egg is done outside the body, it is called *in-vitro* fertilization.

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