2008

Section: A

Question: 1

Name any two vertebrate body parts that are homologous to human forelimbs. [1]

Answer:
Forelimbs of horse / cow / dog/cat
Wings of bird/bat

Question: 2

When and why do some animals like snails go into aestivation? [1]

Answer:
Summer to survive from heat or to escape from desiccation.

Question: 3

What is the economic value of Spirulina? [1]

Answer:
Single Cell Protein or SCP as it is commonly called is the production of microbial biomass for animal consumption, by growing Spirulina, Yeast and Fusarium graminearum in agricultural or other organic wasters.

Question: 4

What was the specialty of the milk produced by the transgenic cow Rosie? [1]

Answer:
It contains human alpha lactalbumin, more balanced nutritionally than normal cow milk.

Question: 5

How do neutrophils act as a cellular barrier to pathogens in humans? [1]

Answer:
Phagocytose kill or destroy microbes.

Question: 6

Mention the polarity of the DNA strands a-b and c-d shown in the replicating fork given below. [1]

Answer:
a-b = 3' – 5'
c – d = 5' – 3'

Question: 7

Mention any two significant roles predation plays in nature. [1]

Answer:
Conduits of energy transfer to the next trophic level and prey population is kept under control and helps in biological control.

Question: 8

Why is the polar region not a suitable habitat for tiny humming birds? [1]

Answer:
When volume is considered surface area is large, loss of heat is more in cooler regions and difficult to generate more heat.

Section: B

Question: 9 *(**)* [2]

a. Expand IUD.
b. Why is hormone releasing IUD considered a good contraceptive to space children?

Question: 10 [2]

Name the interaction in each of the following:
a. Cuscuta growing on a shoe flower plant
b. Mycorrhizae living on the roots of higher plants
c. Clown fish living among the tentacles of sea anemone
d. Koel laying her eggs in crow's nest

Answer:
a. Parasitism.
b. Mutualism
c. Commensalism
d. Brood parasitism.

Question: 11 *(**)* [2]

A plant of Antirrhinum majus with red flowers was crossed with another plant of the same species with white flowers. The plants of the F_1 generation bore pink flowers. Explain the pattern of inheritance with the help of a cross.

OR

A woman with blood group O married a man with AB group. Show the possible blood groups of the progeny. List the alleles involved in this inheritance.

Question: 12

Why do sportspersons often fall a victim to cocaine addiction? [2]

Answer:
Sportspersons often fall a victim to cocaine addiction because cocaine has vasoconstrictor properties. It is a powerful CNS stimulant. It induces a sense of well being and pleasure and delays fatigue. It cause lack of sleep and loss of appetite

Question: 13

State the difference between the first trophic levels of detritus food chain and grazing food chain. [2]

Answer:
DFC – Dead and decaying organic matter / Dead remains of plants and animals = 1
GFC – Living green plants / producers = 1

Question: 14

Coconut palm is monoecious while date palm is dioecious. Why are they called so? [2]

Answer:
Coconut palm produces male and female flowers in same plants.
Date palm – produces male and females flowers in separate plants.

Question: 15

How can DNA segments, separated by gel electrophoresis, be visualized and isolated? [2]

Answer:
Visualized by staining the DNA fragments with ethidium bromide, exposing them to UV radiation.
Bands are cut out from agarose gel, extracted from gel piece (by elution).

Question: 16

How do Darwin's finches illustrate adaptive radiation? [2]

Answer:
Original stock of seed eating finches migrated to different habits (of Galapagos Islands), adapted to different feeding methods by altered beak structure, evolved into different types of finches.

Question: 17

Name the blank spaces a, b, c and d from the table given below: [2]

Types of Microbe	*Scientific name*	*Commercial product*
Bacterium	a	Lactic acid
Fungus	b	Cyclosporine A
c	Monascus purpureus	Statin
Fungus	Penicilliumnotatum	d

Answer:
a – Lactobacillus
b – Trichoderma polysporum
c – Yeast
d – Penicillin

Question: 18

DDT content in the water of a lake that supplies drinking water to the nearby villages is found to be 0.003. The kingfishers of that area are reported to have 2 ppm of DDT.

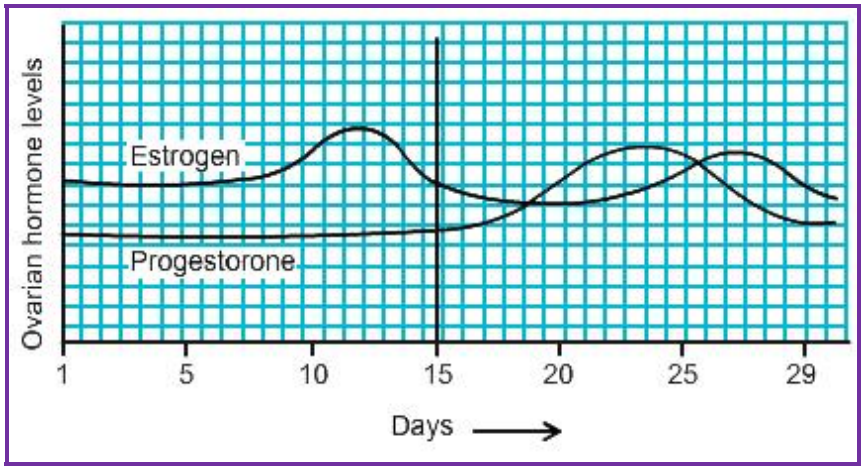
Why has the concentration increased in these birds? What harm will this cause to the bird population? Name the phenomenon. [2]

Answer:

DDT neither excreted nor metabolized, interferes with Calcium metabolism, decline in bird population due to thinning of egg shell or premature breaking of eggs, bio-magnification.

Section: C

Question: 19 [3]



b. Read the graph given above and correlate the uterine events that take place according to the hormonal levels on
   i. 6-15 days
   ii. 16-25 days
   iii. 26-28 days

Answer:

i. Regeneration of endometrium
ii. Uterus gets highly vasculrised, ready for embryo implantation.
iii. Disintegration of the endomtrium.

c. Specify the sources of the hormones mentioned in the graph.

Answer:

Estrogen – by – ovarian follicle.
Progesterone – Corpus luteum

Question: 20

Explain the role of baculoviruses as biological control agents. Mention their importance in organic farming. [3]

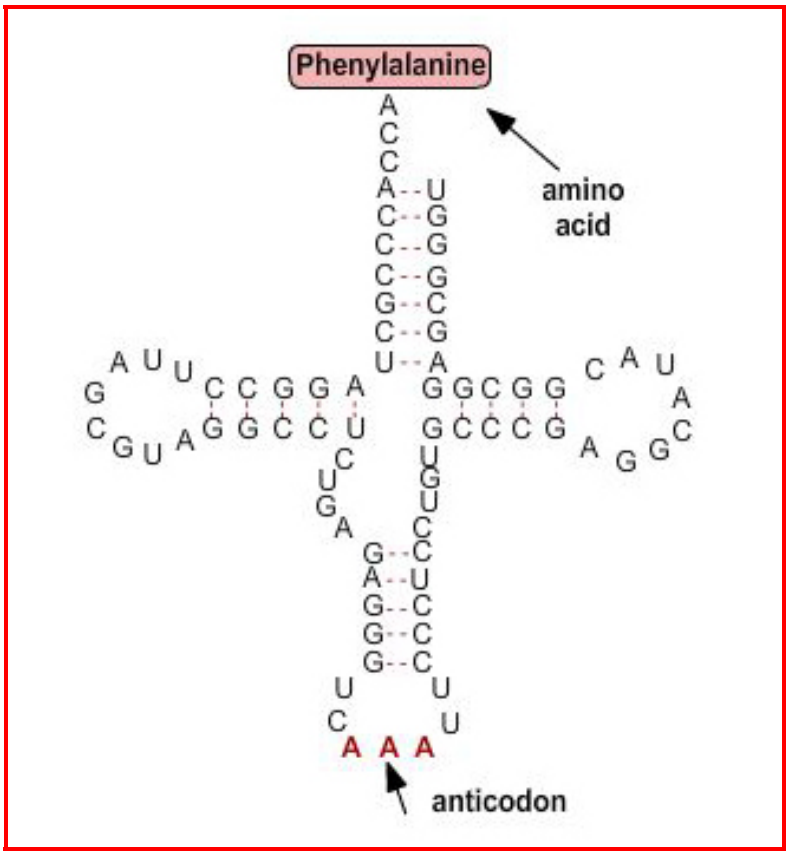
Answer:

Baculoviruses produce narrow spectrum insecticides to kill insects and other arthropods which are species specific, does not affect non target organisms or no negative impact on other insects, mammals, birds, or fish. It eliminates the use of chemical pesticides, conserves beneficial insects, integrated pest management.

Question: 21 [3]

a. Draw the structure of the initiator tRNA adaptor molecule

Answer:

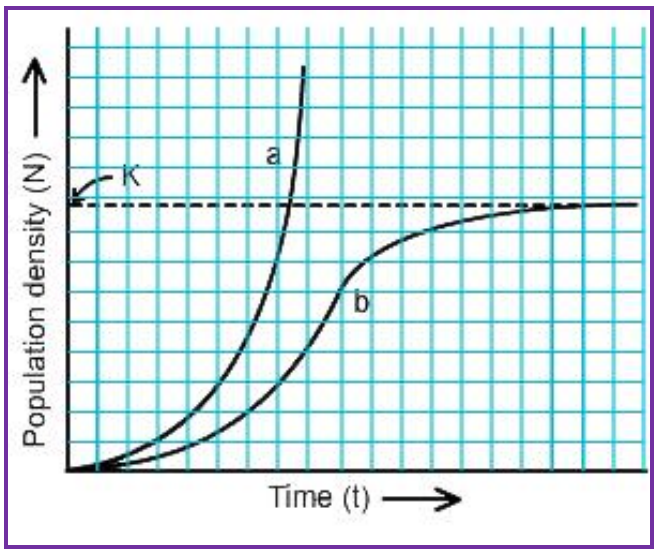


b. Why tRNA is called an adaptor molecule?

Answer:

It reads the code. It binds to specific amino acid.

Question: 22 (**) [3]



Study the population growth curves shown above.
i. Identify curves 'a' and 'b'.
ii. Mention the conditions responsible for the curves 'a' and 'b' respectively.
iii. Give the necessary equation for the curve 'b'.

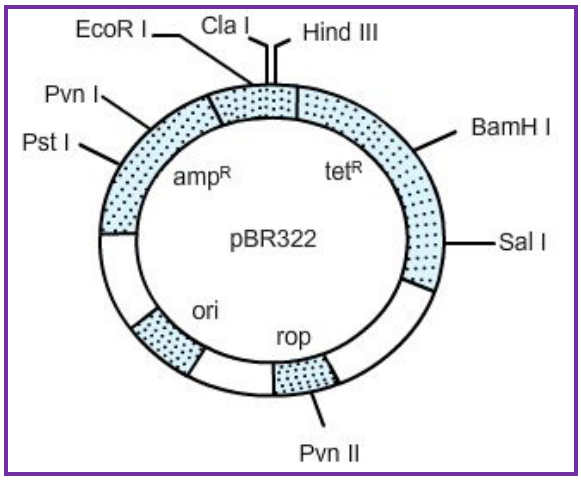
Question: 23 [3]

Why is Agrobacterium tumefaciens a good cloning vector? Explain.

Answer:
If any desired or foreign gene is linked with Ti plasmid of Agrabacterium tumifaciens, the bacterium is modified into non-pathogenic plasmid is cloned into multiple copies, can be delivered into a variety of plants, desired chemical will be produced.

OR

Explain the importance of (a) ori, (b) amp R and (c) rop in the E.coli vector shown below:



Answer:
a. ori – origin of replication

b. ampR – ampicilin antibiotic resistant gene
c. rop – gene to produce the proteins involved in the replication of the plasmid.

Question: 24 [3]

Study the mRNA segment given above which is complete to be translated into a polypeptide chain.

i. Write the codons 'a' and 'b'.

Answer:
a – AUG
b – UAA / UAG / UGA

ii. What do they code for?

Answer:
AUG codes for Methionine.
UAA / UAG / UGA – Stop codon / Nonsense codon and does not code for any amino acid.

iii. How is peptide bond formed between two amino acids in the ribosome?

Answer:
Charged tRNAs are brought closer together on mRNA in the ribosomes, ribosome acts as a catalyst forming peptide bond.

Question: 25 (**) [3]

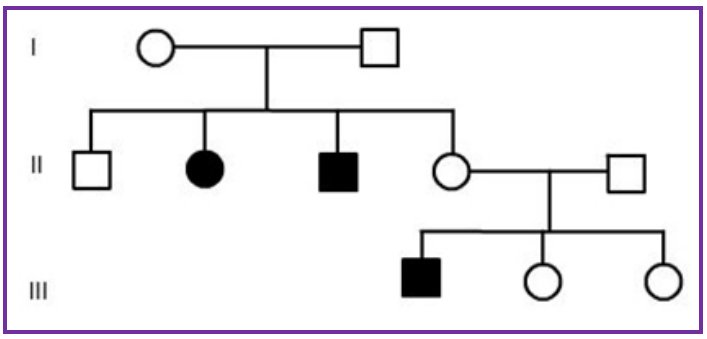
a. Name the infective stage of Plasmodium which Anopheles mosquito takes in along with the blood meal from an infected human.
b. Why does the infection cause fever in humans?
c. Give a flow chart of the part of the life-cycle of this parasite passed in the insect.

Question: 26 (**) [3]

A factory drains its waste water in the nearby lake. It has caused alagal bloom.
a. How was the algal bloom caused?
b. What would be the consequences?
c. Name the phenomenon that caused it.

Question: 27 [3]

State the given pedigree chart and answer the questions that follow.



a. Is the trait recessive or dominant?

Answer:
Recessive

b. Is the trait sex-linked or autosomal?

Answer:
Autosomal.

c. Give the genotypes of the parents in generation I and of their third and fourth child in generation II.

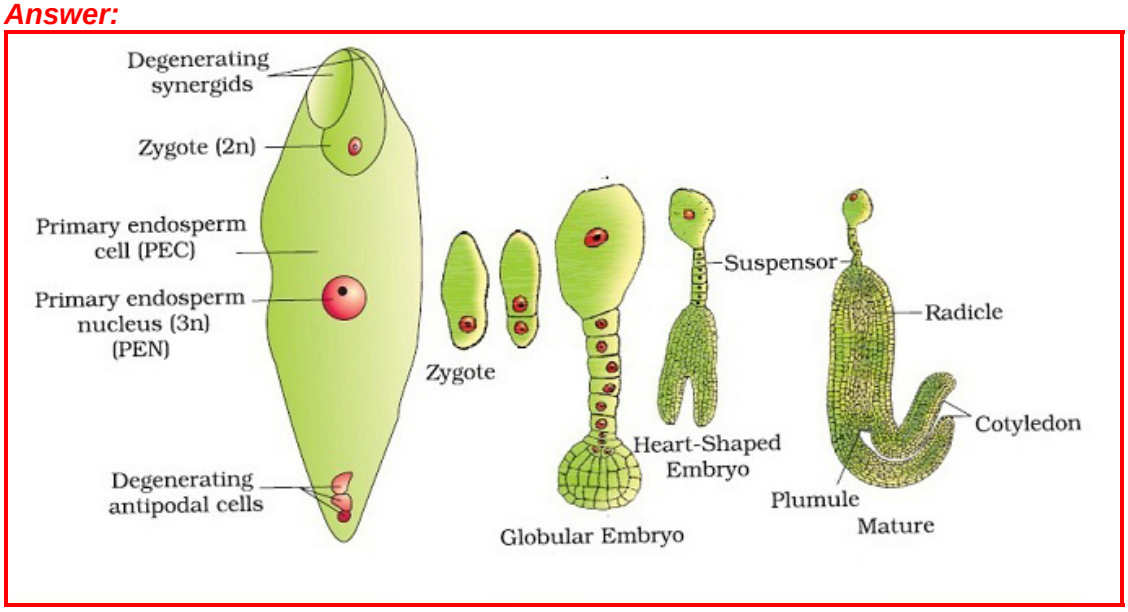
Answer:
Parents – Aa and Aa
Third child – aa
Fourth child – Aa
Any other alphabet can be taken in place of A and a.

Section: D

Question: 28 [5]

a. Draw a schematic labeled diagram of a fertilized embryo sac of an Angiosperm.

Answer:



b. Describe the stages in embryo development in a dicot plant.

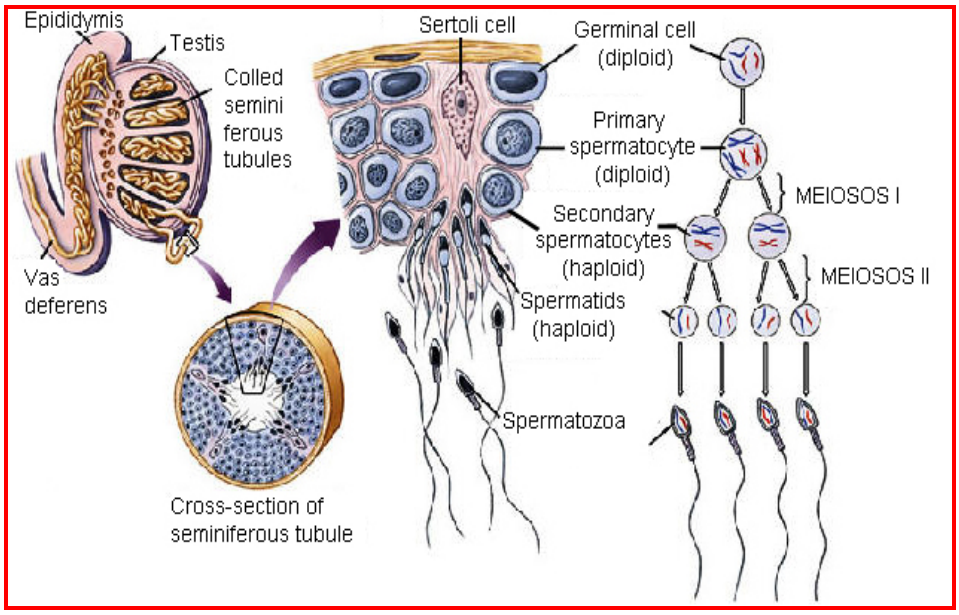
Answer:

The zygote divides unequally to form to cells. The smaller cell divides repeatedly to produce a row of 4-8 cells. The terminal cell divides to produce a cluster of cells called the globular embryo. The remaining cells constitute the suspensor. A few cells of the proembryo nearest of the suspensor develop into hypocotyls and radical while other cells give rise to epicotyl, plumule and cotyledons.

OR

a. Draw a labeled diagram of a sectional view of human seminiferous tubule.

Answer:



b. Differentiate between gametogenesis in human males and females on the basis of
i. Time of initiaton of the process.
ii. Products formed
iii. at the end of the process.

Answer:

i. Male – puberty
Female – foetal or embryonic stage
ii. Male – sperm or spermatozoan
Female - ovum

Question: 29 [5]

Explain the steps involved in the production of genetically engineered insulin.

Answer:

Insulin, secreted from □- cells of Islet of Langerhans of pancreas, maintains blood sugar level and cures Diabetes mellitus in humans.

- **Banting and Best**, along with **Macleod**, succeeded is extracting a pure form of insulin from pancreas of dog and demonstrated that administration of insulin could cure diabetes is human beings.
- **Banting and Macleod** got the Nobel Prize in medicine in 1923 for their outstanding feat.
- **Later** insulin was also extracted from slaughtered pigs and cattle to be used as medicine.
- But this insulin was slightly different from human insulin and thus caused allergies that were **not desired.**

OR

a. Name the nematode that infests and damages tobacco roots.

Answer:

Meloidegyne incognitia.

b. How are transgenic tobacco plants produced to solve this problem?

Answer:

Nematode specific genes isolated cloned and introduced into tobacco plants. Ds RNA are produced and RNA I interference initiated, mRNA translation silenced, survival of the nematode not possible in the host plant.

Question: 30 (**)

What is 'semi-conservative' DNA' replication. How was it experimentally proved and by whom? [5]

*** Out of syllabus. Answer will be provided up on request*