

CBSE Class 12 Biology Question Paper Solution 2011

QUESTION PAPER CODE 57/1/1

EXPECTED ANSWERS/VALUE POINTS

SECTION A

Q.Nos. 1 - 8 are of one mark each.

1. Name the type of cell division that takes place in the zygote of an organism exhibiting haplontic life cycle.

Ans. Meiosis [1 mark]

2. Write the scientific name of the microbe used for fermenting malted cereals and fruit juices.

Ans. Saccharomyces cerevisiae [1 mark]

3. Write the unit used for measuring ozone thickness.

Ans. Dobson (Unit) / D.U. [1 mark]

4. Name the event during cell division cycle that results in the gain or loss of chromosome.

Ans. Failure of segregation of chromatids / non-disjunction / aneuploidy. [1 mark]

5. How can bacterial DNA be released from the bacterial cell for biotechnology experiments?

Ans. (Breaking the cell open) Treating with lysozyme. = 1 [1 mark]

6. Write the importance of cryopreservation in conservation of biodiversity.

Ans. Gametes of threatened species / seeds of commercially important strains can be preserved, in viable and fertile condition / for long periods = $\frac{1}{2} + \frac{1}{2}$ [1 mark]

7. Mention the role of the codons AUG and UGA during protein synthesis.

Ans. AUG - codes for methionine / initiation codon,
UGA - termination codon / stop codon = $\frac{1}{2} + \frac{1}{2}$ [1 mark]

8. Normally one embryo develops in one seed but when an orange seed is squeezed many embryos of different shapes and sizes are seen. Mention how it has happened.

Ans. Some nucellar cells / diploid cells / integument cells surrounding the embryo sac start dividing and protrude into the embryo sac and develop into embryos. (In such species each ovule contains many embryos-polyembryony). [1 mark]

SECTION-B

9. How do histones acquire positive charge ?

Ans. Histones are rich in basic amino acids, Lysine, Arginine (present as residues in their side chains), which are positively charged = $\frac{1}{2} \times 4$ [2 marks]

10. Why is CuT considered a good contraceptive device to space children ?

Ans. Non-hormonal, non-medicated, releases Copper ions, suppresses sperm motility, suppresses fertilising capacity of sperms, phagocytosis of sperms. **Any two** = 1 + 1 [2 marks]

11. Differentiate between albuminous and non-albuminous seeds, giving one example of each.

Ans. Albuminous - (with residual) endosperm is not completely used up during embryonic development eg, wheat / maize / castor / sunflower.

Non albuminous - (without residual) endosperm is completely consumed during embryonic development eg. pea / groundnut. = $\frac{1}{2} \times 4$

(If endosperm present or absent written = $\frac{1}{2}$ mark). [2 marks]

12. Explain the process of RNA interference.

Ans. This method involves silencing of a specific mRNA of the parasite due to complementary dsRNA molecule that binds to and prevents translation of the mRNA (silencing). The source of this complementary RNA could be from an infection from viruses having RNA genomes or mobile genetic elements (transposons) that replicate via RNA intermediate [2 marks]

13. List the key tools used in recombinant DNA technology.

Ans. Restriction enzymes / Polymerase enzymes / Ligase enzymes / Vectors / Host organisms / E. coli / Agrobacterium **Any four** = $\frac{1}{2} \times 4$ [2 marks]

14. Name the two types of immune systems in a human body. Why are cell mediated and humoral immunities so called ?

Ans. Active , Passive // Innate , Acquired // Cell mediated , Humoral // Immune system consisting of Lymphoid organs / tissues / cells , immune system with soluble molecules like antibodies.

Any one pair = $\frac{1}{2} + \frac{1}{2} = 1$

Cell mediated immunity is called so because cells like T-lymphocytes provide immunity / T-cells kill or destroy the antigens.

Humoral immune system is called so because antibodies which attack antigens are found in the blood. (Humor) = $\frac{1}{2} + \frac{1}{2} = 1$ [1+1 = 2 marks]

OR

Write the scientific names of the causal organisms of elephantiasis and ringworm in humans. Mention the body parts affected by them.

Elephantiasis is caused by Wuchereria bancrofti , Legs / scrotum / lymphatic vessels of lower limb = $\frac{1}{2} + \frac{1}{2}$

Ringworm is caused by Trichophyton / Microsporum / Epidermophyton , Skin = $\frac{1}{2} + \frac{1}{2}$

[1 + 1 = 2 marks]

15 Justify with the help of an example where a deliberate attempt by humans has led to the extinction of a particular species.

Ans. The Nile perch introduced into Lake Victoria in East Africa , eventually led to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake //

Abingdon tortoise in Galapagos islands became extinct , after goats were introduced due to greater browsing efficiency of goats //

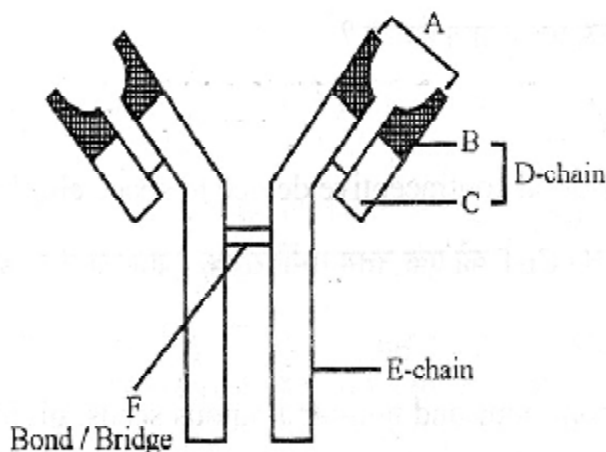
Connell's field experiment showed that the competitively superior barnacle Balanus , excludes smaller barnacle Chathamalus //

over exploitation by man , caused extinction of Stellar's sea cow / Passenger pigeon.

Any one example with justification = 1 + 1

[2 marks]

16. Identify A, D, E and F in the diagram of an antibody molecule given below :



Ans. A - antigen binding site ,

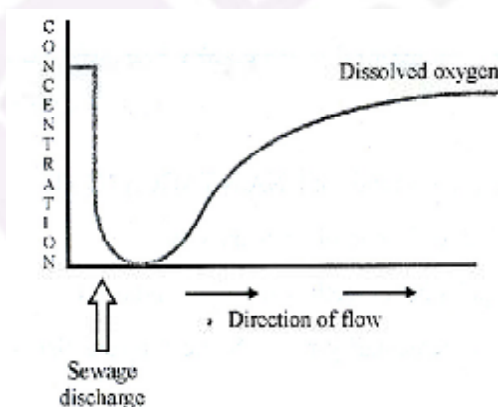
D - light chain ,

E - heavy chain (constant region) ,

F - disulphide bond = $\frac{1}{2} \times 4$

[2 marks]

17. Study the graph given below. Explain how is oxygen concentration affected in the river when sewage is discharged into it.



Ans. Oxygen is used up by microorganisms involved in biodegradation resulting in sharp decline at the point of sewage discharge , the concentration of oxygen increases as we move farther from the point of sewage discharge = 1 + 1

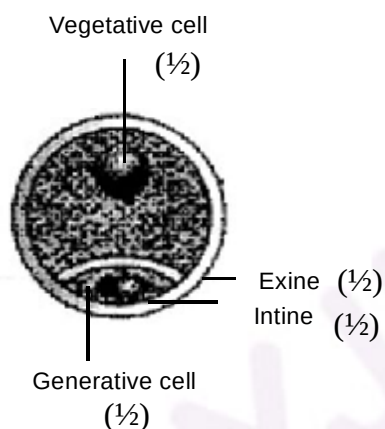
[2 marks]

18. Explain how a hereditary disease can be corrected. Give an example of first successful attempt made towards correction of such diseases.

- Ans. Introduction of required genes into cells and tissues to treat diseases / by delivery of normal gene to take over the function of non-functional gene / by gene therapy ,
First gene therapy was given to four year old girl with Adenosine deaminase deficiency. [2 marks]

SECTION-C

19. Draw a diagram of a male gametophyte of an angiosperm. Label any four parts. Why is sporopollenin considered the most resistant organic material ?



$$\frac{1}{2} \times 4 = 2$$

Sporopollenin can withstand high temperature / strong acids / strong alkali.

Any two = $\frac{1}{2} + \frac{1}{2}$

[3 marks]

20. How are dominance, codominance and incomplete dominance patterns of inheritance different from each other ?

Ans. Dominance : one allele expresses itself in the hybrid heterozygous condition , other is suppressed

Co dominance : both the alleles of a gene express in a heterozygous hybrid containing two dominant alleles.

Incomplete dominance : Neither of the two alleles of a gene is completely dominant over the other in heterozygous condition , the hybrid is intermediate. = 1×3

[3 marks]

21. The base sequence in one of the strands of DNA is TAGCATGAT

- Give the base sequence of its complementary strand.
- How are these base pairs held together in a DNA molecule ?
- Explain the base complementarity rules. Name the scientist who framed this rule.

Ans. (i) ATCGTACTA = 1

(ii) Through Hydrogen bonds , between A and T and C and G on the two strands
= $\frac{1}{2} + \frac{1}{2}$

(iii) A = T and C $\equiv$ G , Watson and Crick / Chargaff = $\frac{1}{2} + \frac{1}{2}$ [3 marks]

22. (a) Sickle celled anaemia in humans is a result of point mutation. Explain.

(b) Write the genotypes of both the parents who have produced a sickle celled anaemic offspring.

Ans. (a) Mutation arising due to change in a single base pair of DNA , the defect is caused by the substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule. = 1 + 1 = 2

(b) Father - Hb^A Hb^S , Mother - Hb^A Hb^S = $\frac{1}{2} + \frac{1}{2}$

(Both parents are heterozygous)

[2 + $\frac{1}{2}$ + $\frac{1}{2}$ = 3 marks]

23. What is inbreeding depression and how is it caused in organisms ? Write any two advantages of inbreeding.

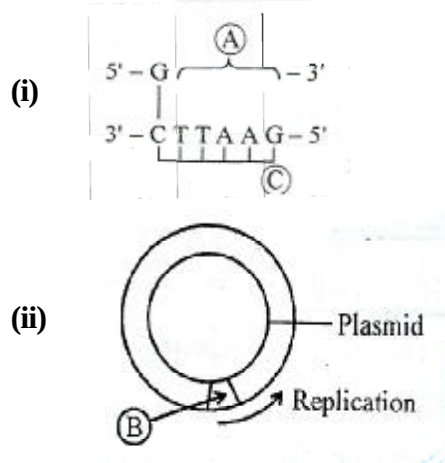
Ans. Continuous close inbreeding for several generations, reduces fertility and productivity is called inbreeding depression = $\frac{1}{2} + \frac{1}{2}$

Advantages- produces pure lines / eliminates inferior genes , accumulation of superior genes

Any two = 1 + 1 = 2

[1 + 2 = 3 marks]

24. (a) Identify (A) and (B) illustrations in the following :



- (b) Write the term given to (A) and (C) and why ?
- (c) Expand PCR. Mention its importance in biotechnology

Ans. (a) (A) - AATTC / Sticky end = $\frac{1}{2}$

(B) - Ori / Origin of Replication = $\frac{1}{2}$

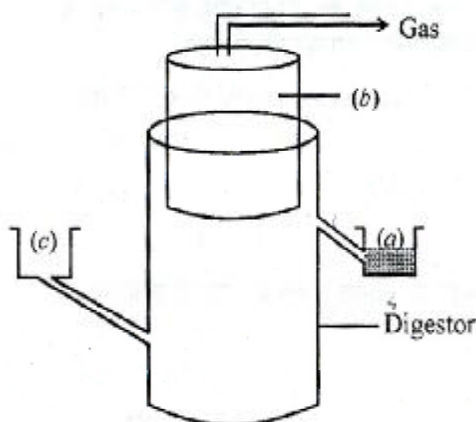
(b) Pallindromic sequence , because the sequence of base pairs reads same on the two strands when orientation of reading is kept the same = $\frac{1}{2} + \frac{1}{2} = 1$

(c) PCR - Polymerase Chain Reaction = $\frac{1}{2}$,

Importance - amplification of gene of interest (in vitro) = $\frac{1}{2}$

[3 marks]

25.



The diagram above is that of a typical biogas plant. Explain the sequence of events occurring in a biogas plant. Identify a, b and c.

Ans. Bio wastes are collected and a slurry of dung is fed , a floating cover having gas outlet is placed over slurry which keeps on rising as the gas is produced in the tank, the spent slurry is removed through another outlet and may be used as fertiliser = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

(a) sludge loader

(b) gas holder / CH_4 and CO_2

(c) dung and water = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

[3 marks]

26. How can crop varieties be made disease resistant to overcome food crisis in India ? Explain. Name one disease resistant variety in India of:

(a) Wheat to leaf and stripe rust

(b) Brassica to white rust

Ans. By screening germplasm for resistance sources , hybridisation of selected parents , selection and evaluation of the hybrids and testing and release of new varieties // mutation breeding - it is possible to induce mutations artificially through use of chemicals or radiations (like gamma radiations) , and selecting and using the plants of desirable character as a source in breeding. // Selection amongst somaclonal variants / Genetic engineering - **Any one** explained = 2

(a) Himgiri = $\frac{1}{2}$

(b) Pusa swarnim / Karan rai = $\frac{1}{2}$

[2 + $\frac{1}{2}$ + $\frac{1}{2}$ = 3 marks]

OR

Write the source and the effect on the human body of the following drugs :

(i) **Morphine**

(ii) **Cocaine**

(iii) **Marijuana**

Ans. (i) Morphine - poppy plant / Papaver somniferum , depressant = $\frac{1}{2}$ + $\frac{1}{2}$ = 1

(ii) Cocaine - Erythroxylum coca , stimulates CNS / causes euphoria / hallucination
= $\frac{1}{2}$ + $\frac{1}{2}$ = 1

(iii) Marijuana - Cannabis sativa , effects cardiovascular system of the body = $\frac{1}{2}$ + $\frac{1}{2}$ = 1

[1 + 1 + 1 = 3 marks]

27. Name the type of interaction seen in each of the following examples :

(i) Ascaris worms living in the intestine of human

(ii) Wasp pollinating fig inflorescence

(iii) Clown fish living among the tentacles of sea-anemone

(iv) Mycorrhizae living on the roots of higher plants

(v) Orchid growing on a branch of a mango tree

(vi) Disappearance of smaller barnacles when Balanus dominated in the Coast of Scotland.

Ans. (i) Parasitism

(ii) Mutualism

(iii) Commensalism

- (iv) Mutualism
- (v) Commensalism
- (vi) Competition

= $\frac{1}{2} \times 6$ [3 marks]

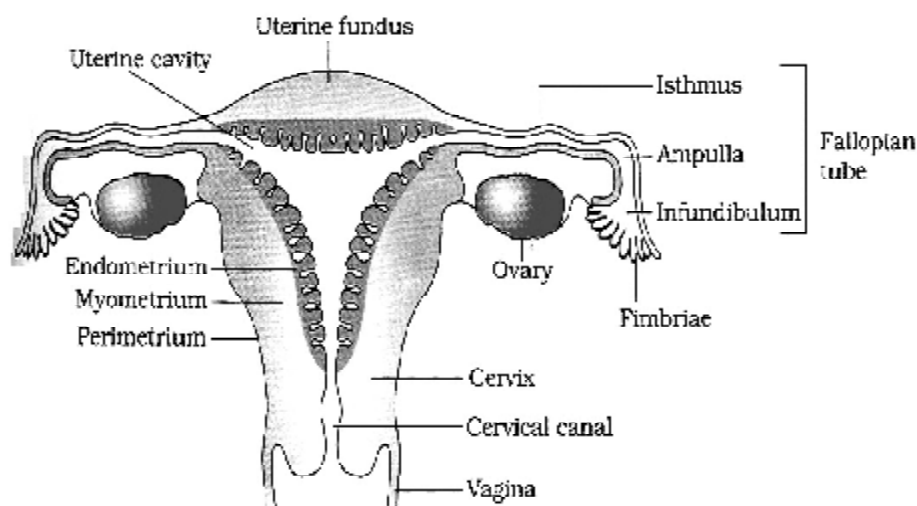
SECTION-D

28. (a) Draw a labelled diagram of the human female reproductive system.

(b) Enumerate the events in the ovary of a human female during :

(i) Follicular phase (ii) Luteal phase of menstrual cycle

Ans. (a)



Any six correct labels on a correct diagram = $\frac{1}{2} \times 6 = 3$

(b) (i) Follicular phase - primary follicles grow and mature , secretion of estrogen , first meiotic division (**Any two** = $\frac{1}{2} \times 2$)

(ii) Luteal phase - development of corpus luteum , secretion of progesterone
= $\frac{1}{2} + \frac{1}{2}$

[3 + 1 + 1 = 5 marks]

OR

(a) Write the specific location and the functions of the following cells in human males :

(i) Leydig cells

(ii) Sertoli cells

(iii) Primary spermatocyte

(b) Explain the role of any two accessory glands in human male reproductive system

- Ans. (a) (i) Leydig cells - found in interstitial spaces between seminiferous tubules, secrete androgens / testosterone = $\frac{1}{2} + \frac{1}{2} = 1$
- (ii) Sertoli cells - found in between spermatocyte inside seminiferous tubules, nourish developing spermatozoa / sperms / germ cells = $\frac{1}{2} + \frac{1}{2} = 1$
- (iii) Primary spermatocytes - found in the inner lining of seminiferous tubules, they undergo meiosis and form sperms = $\frac{1}{2} + \frac{1}{2} = 1$

(b) The accessory glands are seminal vesicle, prostate gland, bulbourethral gland **any two** mentioned = $\frac{1}{2} + \frac{1}{2}$

Secretions of these glands constitute seminal plasma which is rich in fructose, calcium and certain enzymes provide nourishment to sperms / Secretions of bulbourethral glands also help in lubrication of penis **Any two** mentioned = $\frac{1}{2} + \frac{1}{2}$

[1 + 1 + 1 + 1 + 1 = 5 marks]

29. Explain the salient features of Hugo de Vries theory of mutation. How is Darwin's theory of natural selection different from it ? Explain.

- Ans. Hugo de Vries based his work on evening primrose, brought forth the idea of mutations - differences arising suddenly in a population, He believed large single step mutation called saltation, caused speciation. = $\frac{1}{2} \times 4 = 2$

Darwin's theory	Hugo de Vries
(i) Directional	Directionless
(ii) Gradual / slow	sudden
(iii) Continuous variation	Random

$1 \times 3 = 3$

[2 + 3 = 5 marks]

OR

(a) Name the primates that lived about 15 million years ago. List their characteristic features.

- (b) (i) Where was the first man-like animal found ?
- (ii) Write the order in which Neanderthals, Homo habilis and Homo erectus appeared on earth. State the brain capacity of each one of them.
- (iii) When did modern Homo sapiens appear on this planet ?

Ans. (a) Dryopithecus , Ramapithecus = $\frac{1}{2} + \frac{1}{2} = 1$

Dryopithecus is ape like and hairy , walked like Gorillas and Chimpanzees ,
Ramapithecus more man like , **Any two** = $\frac{1}{2} + \frac{1}{2} = 1$

(b) (i) Ethiopia / Tanzania / Eastern Africa = $\frac{1}{2}$

(ii) Order = Homo habilis , Homo erectus , Neanderthals = $\frac{1}{2}$

Cranial capacity = Homo habilis = 650 - 800 cc, Homo erectus = 900
cc, Neanderthals = 1400 cc = $\frac{1}{2} \times 3 = 1\frac{1}{2}$

(iii) During ice age / 75000 - 10000 years ago = $\frac{1}{2}$

[1 + 1 + $\frac{1}{2}$ + $\frac{1}{2}$ + $1\frac{1}{2}$ + $\frac{1}{2}$ = 5 marks]

30. (a) **Explain primary productivity and the factors that influence it.**

(b) **Describe how do oxygen and chemical composition of detritus control decomposition.**

Ans. (a) Primary productivity : amount of biomass / organic matter produced per unit
area over a time period by the plant during photosynthesis = 1

Factors : availability of nutrients / quality of light available / availability of
water / temperature of the given place / type of plant species of the area /
photosynthetic capacity of the plants **Any four** = $\frac{1}{2} \times 4 = 2$

(b) Oxygen increases rate of decomposition = 1

Chemical : decomposition is slow when chitin and lignin are present = 1

[1 + 2 + 1 + 1 = 5 marks]

OR

(a) **What is El Nino effect ? Explain how it accounts for biodiversity loss.**

(b) **Explain any three measures that you as an individual would take, to
reduce environmental pollution.**

Ans. (a) Rise in temperature leading to deleterious changes in the environment and
resulting in odd climatic changes is El Nino effect = 1

Increased melting of polar ice / submerging of coastal areas / flood / loss of
habitat leading to loss of biodiversity **Any two** = $\frac{1}{2} + \frac{1}{2} = 1$

- (b) Less use of fossil fuel / Planting more trees / Use of lead free petrol or diesel /
Use of low sulphur petrol and diesel / Following laws laid down in relation to
sound / avoiding use of DDT / Reducing our garbage generation etc.

Any three = $1 \times 3 = 3$

[1 + 1 + 3 = 5]

