CBSE Class 12 Biology Question Paper Solutions Code 57/5/1

SECTION – A

1. Which one of the following part of the plant when put into the soil is likely to produce new offspring ?

(a) Part of an internode

(b) A stem cutting with a node

(c) Part of a primary root

(d) A flower

Ans. (b) / a stem cutting with a node

[1 Mark]

2. In a bacterium when RNA-polymerase binds to the promoter on a transcription unit during transcription, it

(a) terminates the process

(b) helps remove introns

(c) initiates the process

(d) inactivates the exons

Ans. (c) / initiates the process

[1 Mark]

3. The hypothesis that "Life originated from non-living organic pre-existing molecules was proposed by

(a) Oparin and Haldane

(b) Louis Pasteur

(c) S.L. Miller

(d) Hugo de Vries

Ans. (a) / Oparin and Haldane

[1 Mark]

4. Mating of a superior male of a breed of a cattle to a superior female of another breed is called

(a) in breeding

(b) out crossing

(c) out breeding

(d) cross breeding

Ans. (d) / cross breeding

[1 Mark]

OR

Large-holes in 'Swiss-Cheese' are due to

(a) Propionibacterium sharmanii

(b) Saccharomyces cerevisae

(c) Penicillium chrysogenum

(d) Acetobacter aceti

Ans. (a) / *Propionibacterium sharmanii*

[1 Mark]

5. Increased concentration of DDT in fish-eating birds is due to

(a) eutrophication

(b) bio-magnification

(c) cultural eutrophication

(d) accelerated eutrophication

Ans. (b) / bio-magnification

[1 Mark]

OR

Species-Area relationship is represented on a log scale as

(a) hyperbola

(b) rectangular hyperbola

(c) linear

(d) inverted

Ans. (c) / linear

[1 Mark]

SECTION –B

(Q Nos. 6-12 are of two marks each)

6. State two advantages of an apomictic seed to a farmer.

Ans. There is no segregation of characters in apomictic seeds ,
the farmers can keep on using the hybrid seeds to raise new crops year after year / desired varieties can be cultivated year after year ,
hybrid characters can be preserved ,
the farmers do not have to buy hybrid seeds every year
Any two = 1 × 2

[2 Marks]

7. Explain when is a genetic code said to be

(a) Degenerate

(b) Universal

Ans. (a) Some amino acids are coded by more than one codon / explained with any correct example = 1

(b) A particular codon codes for the same amino acid in all organisms / as an example from bacteria to human UUU would code for phenylalanine (Phe) / any other correct example = 1

[2 Marks]

8. Differentiate between opioids and cannabinoids on the basis of their

(a) specific receptor site in human body.

(b) mode of action in human body.

	Opioids	**Cannabinoids**
a.	central nervous system / gastrointestinal tract	Brain = 1
b.	depressant /slows down body functions / sedative / pain killer	effects on cardiovascular system of the body functions /analgesic / increased muscle strength / increased performance in sports persons / hallucinogen =1

[1 + 1 = 2 Marks]

9 (a) Name the two techniques employed to meet the increasing demand of fish in the world.

(b) Name any two fresh water fishes.

Ans. (a) Aquaculture , Pisciculture = ½ × 2

(b) Catla / *Catla catla* , Rohu / *Labeo rohita* , Common Carp , *Clarias* / Magur , *Anabas* / Climbing Perch , Calbasu , Mrigal / *Cirrhina mrigala* , Singhara / *Mystus* , Singhi / *Hetropneustes*

(*Any two*) = ½ × 2

[2 Marks]

OR

Describe the contributions of Alexander Fleming, Ernest Chain and Howard Florey in the field of microbiology.

Ans. (Alexander Fleming) - discoverd antibiotic Penicillin , = 1

(Ernest Chain & Howard Florey) - its full potential as an effective antibiotic was established by them = 1

[1 + 1 = 2 Marks]

10. All cloning vectors do have a 'selectable marker'. Describe its role in recombinant DNA-technology.

Ans. It helps in identifying and eliminating non-transformants (non-recombinants) , and selectively permitting the growth of transformants (recombinants) = 1 × 2

[2 Marks]

11 Mention how have plants developed mechanical and chemical defence against herbivores to protect themselves with the help of one example of each.

Ans. Mechanical - By developing (modified)Thorns (which are means of defence) eg. Acacia / Cactus / any other appropriate example = 1

Chemical - by producing and storing poisonous chemicals / like cardiac glycosides / nicotine / caffeine / quinine / strychnine / opium / Calotropis has cardiac glycosides / any other appropriate example - provides defence against grazers / browsers = 1

[2 Marks]

12. Name and explain the processes earthworm and bacteria carry on detritus.

Ans. (Earthworm) - breaks down detritus into smaller particles , fragmentation = ½ × 2

(Bacteria) - (Enzymes of it) break down detritus into simple inorganic substances , catabolism / mineralization = ½ × 2

[2 Marks]

SECTION - C

13. Explain three different modes of pollination that can occur in a chasmogamous flower.

Ans. (Autogamy / Self pollination) - Pollination is achieved within the same flower / transfer of pollen grains from the anther to the stigma of the same flower = 1 //

(Geitonogamy) - Transfer of pollen grains from the anther to the stigma of another flower of the same plant = 1 //

(Xenogamy / Cross pollination) - Transfer of pollen grains from anther to the stigma of flowers of a different plant = 1 //

(Anemophily) - Transfer of pollen grains from anther to stigma of same / another flower through wind = 1 //

(Zoophily) - Transfer of pollen grains from anther to stigma of same / another flower through animals= 1 //

(Chiropterophily) - Transfer of pollen grains from anther to stigma of same / another flower through bats = 1 //

(Hydrophily) - Transfer of pollen grains from anther to stigma of same / another flower through water = 1 //

(Entomophily) - Transfer of pollen grains from anther to stigma of same / another flower through insects = 1 //

(Ornithophily) - Transfer of pollen grains from anther to stigma of same / another flower through birds = 1 //

(Malacophily) - Transfer of pollen grains from anther to stigma of same / another flower through snails = 1

(any three) = 1 × 3

[1 × 3 = 3 Marks]

OR

Explain the formation of placenta after implantation in a human female.

Ans. Trophoblast (of blastocyst) forms finger like projections / chorionic villi , which are surrounded by the uterine tissue and maternal blood , The chorionic villi and uterine tissue become interdigitated to form placenta = 1 × 3

[3 Marks]

14. State Mendel's law of dominance. How did he deduce the law ? Explain with the help of a suitable example.

Ans. Factors (characters are controlled by discrete units called factors) which occur in pairs , in a dissimilar pair of factors / heterozygous one member of a pair dominates (dominant) the other (recessive) = ½ × 2

In a cross between tall (TT) plant and dwarf (tt) plant , tall trait appears in F1 , tallness and dwarfness appear in F2 , in the ratio 3 : 1 = ½ × 4

// In lieu of the above explanation any other typical monohybrid cross till F2 generation can be considered.

[1 + 2 = 3 Marks]

15. What are 'SNPs' ? Where are they located in a human cell ? State any two ways the discovery of SNPs can be of importance to humans.

Ans. SNPs - Single Nucleotide Polymorphism / locations where single base DNA differences occur in humans = 1

Location - human genome / human chromosome = 1

Importance - Finding chromosomal location for disease - associated sequences , and tracing human history = ½ × 2

[3 Marks]

16. (a) State what does the study of Fossils indicate.

(b) Rearrange the following group of plants according to their evolution from Palaeozoic to Cenozoic periods :

Rhynia; Arborescent Lycopods; Conifers; Dicotytedon.

Ans. (a) They are an evidence of evolution / they indicate common ancestory / they represent extinct organisms / which existed in different geological period / life forms varied over time and certain life forms were restricted to certain geological time spans / new forms of life have arisen at different times in the history of earth (any two) = 1 + 1

(b) Rhynia → Arborescent Lycopods (½) → Conifers → Dicotyledon (½)

// if a student writes given sequence is correct = 1

[3 Marks]

17. (a) Explain the mode of action of Cu^{++} releasing IUDs as a good contraceptive. How is hormone releasing IUD different from it ?

(b) Why is 'Saheli' a preferred contraceptive by women (any two reasons) ?

Ans. (a) Cu^{++} releasing IUDs - Suppress sperm motility / suppress the fertilizing capacity of sperms = 1

Hormone releasing IUDs - Make the uterus unsuitable for implantation / the cervix hostile to the sperms = 1

(b) It is a 'once a week' pill / oral contraceptive / with very few side effects / high contraceptive value/ non-steroidal / easy to use / not expensive (any two) = ½ × 2

[3 Marks]

18. (a) Explain why bee-hives are set up on the farms for some of our crop-species. Name any two such crop species.

(b) List any three important steps to be kept in mind for successful bee keeping.

Ans. (a) Increases pollination efficiency / improves the crop yield / increases honey yield = ½

Sunflower / *Brassica* / Apple / Pear/ any other appropriate examples (any two) = ½ × 2

(b) Knowledge of the nature and habits of bees / Selection of suitable location for keeping the beehives / Catching and hiving of swarms (group of bees) / Management of beehives during different seasons / Handling and collection of honey and of beeswax (Any three) = ½ × 3

[3 Marks]

19. Why GMOs are so called ? List the different ways in which GMO plants have benefitted and have become useful to humans.

Ans. Plants / bacteria / fungi / animals whose genes have been altered by manipulation are called Genetically Modified Organisms (GMO) = 1

(i) Made crops more tolerant to abiotic stresses (cold / drought / salt / heat) /

(ii) Reduced reliance on chemical pesticides (pest-resistant crops) /

(iii) Helped to reduce post harvest losses /

(iv) Increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil) /

(v) Enhanced nutritional value of food, e.g., Vitamin 'A' enriched rice /

(vi) To create tailor-made plants to supply alternate resources to industries (in the form of starch / fuels / pharmaceuticals)

Any other correct beneficial uses of genetically modified bacteria / fungi / animals to be evaluated

(any four) = ½× 4

[1 + 2 = 3 Marks]

20. Differentiate between "Pioneer-species"; "Climax-community" and "Seres".

Ans. Pioneer species - The species that invade a bare area = 1

Climax community - a community that is in near equilibrium with the environment / remains stable as long as the environment remains unchanged = 1

Sere - The entire sequence of communities that successively change in a given area = 1

[3 Marks]

OR

Explain any three ways other than zoological parks, botanical gardens and wildlife safaries, by which threatened species of plants and animals are being conserved 'ex situ'.

Ans.
- Gametes of threatened species can be preserved in viable / fertile condition for long periods using cryopreservation techniques /
- eggs can be fertilized in vitro /
- plants can be propagated using tissue culture methods /
- Seeds of different genetic strains of commercially important plants can be kept for long periods in seed banks /
- Storing semen / sperms in sperm bank /
- pollen grains can be stored in pollen banks

(any three) = 1 × 3

[3 Marks]

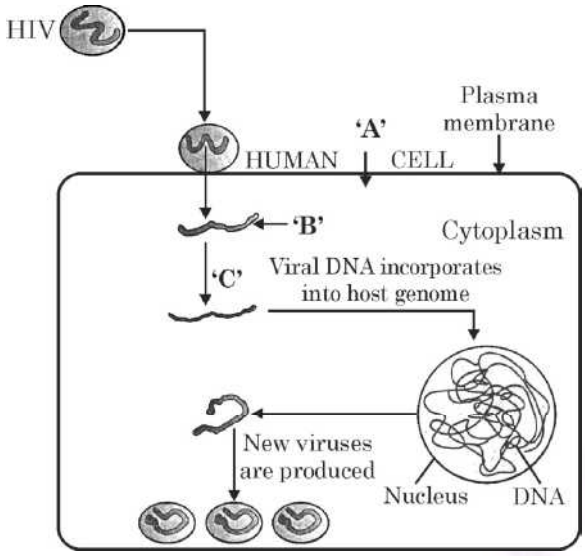
21. Explain 'Integrated organic' farming as successfully practiced by Ramesh C. Dagar, a farmer in Sonepat (Haryana).

Ans. He includes bee-keeping / dairy management / water harvesting / composting / and agriculture in a chain of processes which support each other (any three) = 1½
Cattle excreta (dung) are used as manure / Crop waste is used to create compost / which can be used as a natural fertiliser / generate natural gas for satisfying the energy needs of the farm (any three) = 1½

[1½ + 1½ = 3 Marks]

SECTION - D

22. Study the diagram showing the entry of HIV into the human body and the processes that are followed :



(a) Name the human cell 'A' HIV enters into.

(b) Mention the genetic material 'B' HIV releases into the cell.

(c) Identify enzyme 'C'.

Ans. (a) Macrophage

(b) RNA / viral RNA

(c) Reverse transcriptase

[1 × 3 = 3 Marks]

23. Following a road accident four injured persons were brought to a nearby clinic. The doctor immediately injected them with tetanus antitoxin.

(a) What is tetanus antitoxin ?

(b) Why were the injured immediately injected with this antitoxin ?

(c) Name the kind of immunity this injection provided.

Ans. a) A preparation containing (pre-formed / readymade) antibodies to the toxin = 1

b) To provide quick immune response / to neutralize or nullify the effect of the tetanus bacteria / pathogen = 1

c) Passive immunity = 1

[3 Marks]

24. "The population of a metro city experiences fluctuations in its population density over a period of time."

(a) When does the population in a metro city tend to increase ?

(b) When does the population in metro city tend to decline ?

(c) If 'N' is the population density at the time 't', write the population density at the time 't + 1'.

Ans. (a) Number of births / Natality / Number of immigrants / (B+I) is more than the number of deaths / mortality / number of emigrants / (D+E) //

Pre-reproductive population far exceeds reproductive population = 1

(b) If number of deaths / mortality / number or emigrants / (D + E) is more than (B+I) //

Pre-reproductive population is less than reproductive population = 1

(c) $N_{t+1} = N_t + [(B+I) - (D+E)]$

(B = Natality , I = Immigration , D = Mortality , E = Emigration) = 1

[3 Marks]

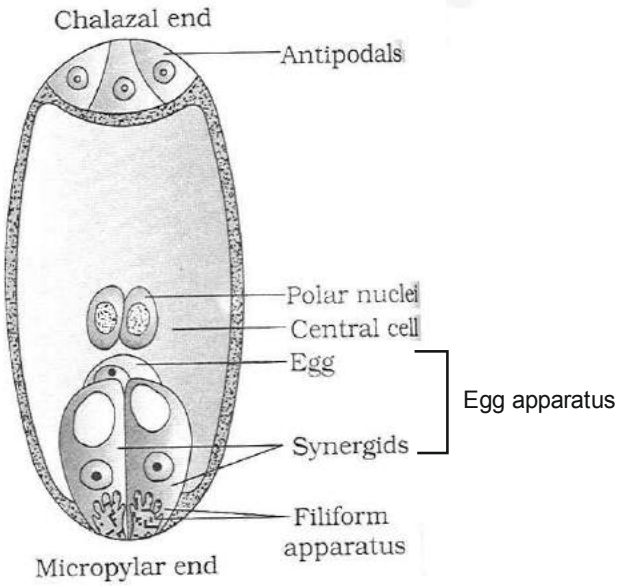
SECTION - E

25. (a) Describe the process of megasporogenesis, in an angiosperm.

(b) Draw a diagram of a mature embryo sac of angiosperm, label its any six parts.

Ans. (a) The MMC in the nucellus undergoes meiotic division , results in the production of four megaspores , one of the megaspores is functional , while the other three degenerate = ½ × 4

(b)



(any 6 correct labels) =½ × 6

OR

(a) Where and how in the testes process of spermatogenesis occur in humans.

(b) Draw diagram of human sperm and label four parts.

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Ans. (a) Seminiferous Tubules = ½

The spermatogonia multiply by mitotic division to form primary spermatocytes , which undergo meiosis leading to formation of two equal (haploid) cells called secondary spermatocytes , The secondary spermatocytes undergo the second meiotic division to produce four (equal haploid) spermatids , The spermatids are transformed into spermatozoa (sperms) by the process called , spermiogenesis = ½ × 5

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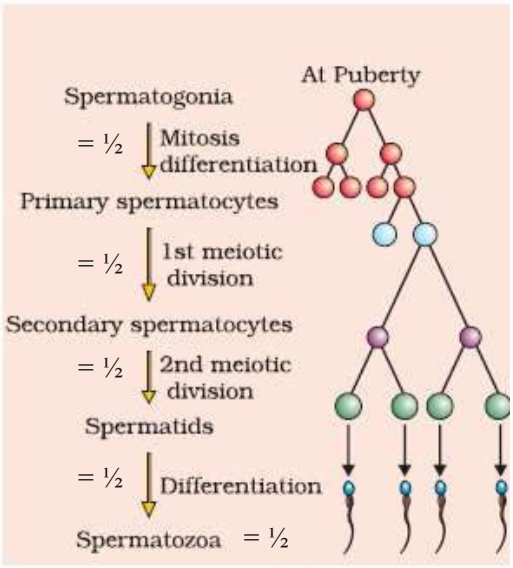
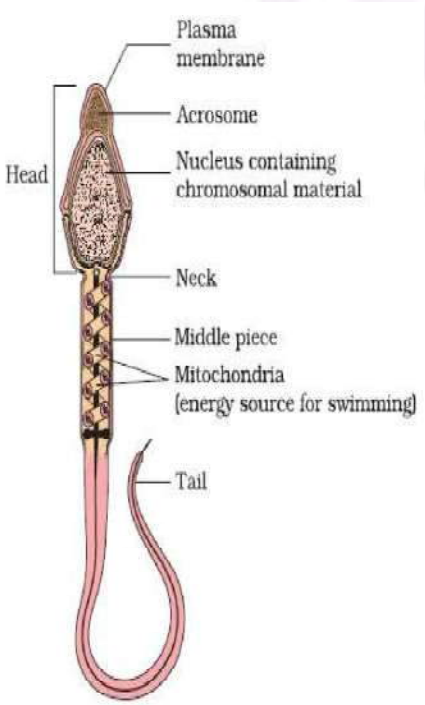


= ½ × 5

(b)



Any four correct labels = ½ × 4

[3 + 2 = 5 Marks]

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26. (a) Why did T.H. Morgon select Drosophila melanogaster for his experiments ?

(b) How did he disprove Mendelian dihybrid F_2 phenotypic ratio of 9 : 3 : 3 : 1 ? Explain giving reasons.

Ans. a) They could be grown on simple synthetic medium in the laboratory / they complete their life cycle in about two weeks / a single mating could produce a large number of progeny flies / there was a clear differentiation of the sexes - the male and female flies are easily distinguishable / it has many types of hereditary variations that can be seen with low power microscopes. (any 3) = 1 × 3

b) Morgan observed that genes of the traits closely linked on the same chromosome show much less recombinant percentage , whereas genes of the traits loosely linked on the same chromosome showed higher recombinant percentage. (This proved deviation from 9 : 3 : 3 : 1) = 1 + 1

[3 + 2 = 5 Marks]

OR

(a) List any four major goals of Human Genome project.

(b) Write any four ways the knowledge from HGP is of significance for humans.

(c) Expand BAC and mention its importance.

Ans. a) Some of the important goals of HGP were as follows:

(i) Identify all the approximately 20,000-25,000 genes in human DNA ,

(ii) Determine the sequences of the 3 billion chemical base pairs that make up human DNA,

(iii) Store this information in databases ,

(iv) Improve tools for data analysis ,

(v) Transfer related technologies to other sectors such as industries ,

(vi) Address the ethical legal and social issues (ELSI) that may arise from the project

(any 4) = ½ × 4

b) Solving challenges in health care/ agriculture /energy production/ environmental remediation / diagnosed disorder / treat disorders / prevents disorders (any four) = ½ × 4

c) BAC - bacterial artificial chromosomes = ½

Used as vector for cloning of DNA fragments = ½

[2 + 2 + 1 = 5 Marks]

27. (a) Name the insect that attacks cotton crops and causes lot of damage to the crop. How has Bt cotton plants overcome this problem and saved the crop ? Explain.

(b) Write the role of gene Cry IAb.

Ans. (a) (cotton) bollworms = 1

B. thuringiensis forms protein crystals (during a particular phase of their growth) ,

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these crystals contain a toxic insecticidal protein, the Bt toxin protein exist as inactive protoxins but once an insect ingest the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut which solubilise the crystal , the activated toxin binds to the surface of midgut epithelial cells and create pores, that cause cell swelling and lysis and eventually cause death of the insect = ½ × 6

b) crylAb controls corn borer =1 //

* Since the capital 'C' denotes protein (Cryprotein) and not the gene (cry gene) , hence every student should be awarded 1 mark whether question is attempted or not attempted.

OR

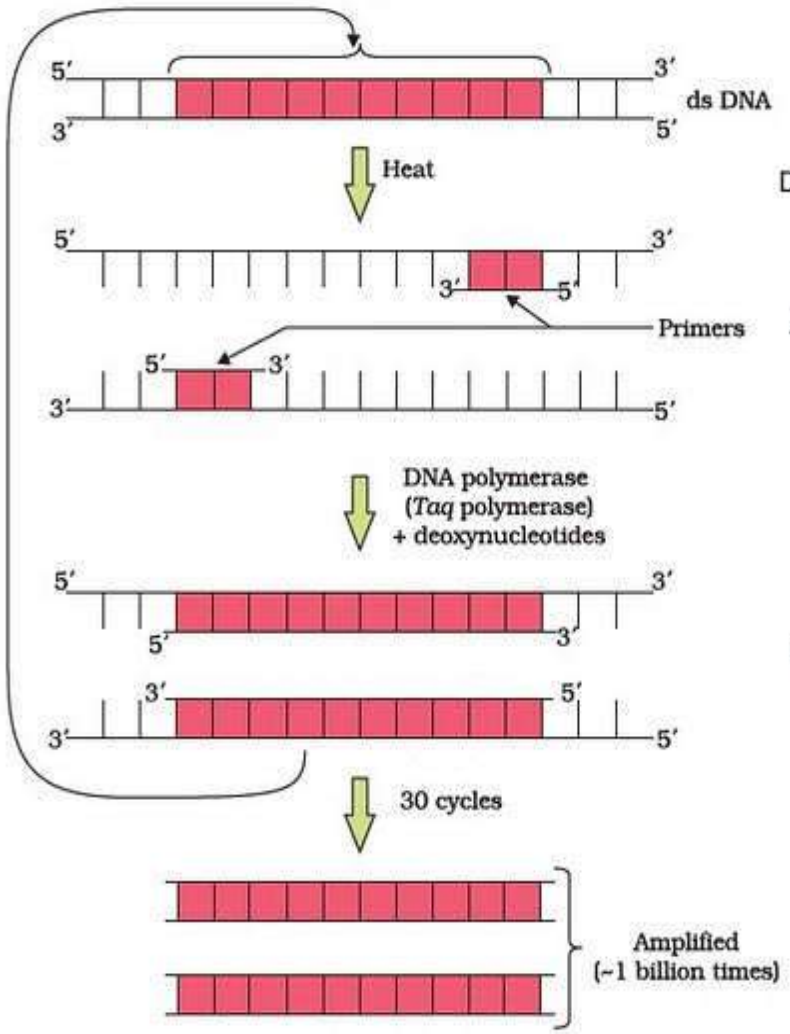
(a) Explain the different steps carried out in Polymerase Chain Reaction, and the specific roles of the enzymes used.

(b) Mention application of PCR in the field of

(i) Biotechnology

(ii) Diagnostics

Ans. (a)



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//

Explanation of different steps of PCR in lieu of the diagram can be evaluated.

Enzyme DNA polymerase / Taq polymerase , the enzyme extends the primers using nucleotide provided in the reaction = ½ + ½

(b) (i) Multiple copy of gene of interest can be made in vitro / gene amplification = ½

(ii) Early detection of disease at a time when the symptoms are not yet visible // or the toxin is in low concentration / used to detect mutations in genes in suspected cancer patients / a powerful technique to identify many other genetic disorders = ½

[4 + 1 = 5 Marks]