

**SOLVED
PAPER
with CBSE
Marking Scheme**

**C.B.S.E.
2018
Class–XII
Delhi & Outside Delhi**

Biology

Time : 3 Hours

Max. Marks : 70

General Instructions :

- (i) There are a total of **26** questions and five sections in the question paper. **All** questions are compulsory.
- (ii) Section **A** contains questions number **1** to **5**, very short-answer type question of **1** mark each.
- (iii) Section **B** contains questions number **6** to **10**, short-answer type I questions of **2** marks each.
- (iv) Section **C** contains question number **11** to **22**, short-answer type II question of **3** marks each.
- (v) Section **D** contains question number **23**, value based question* of **4** marks.
- (vi) Section **E** contains question number **24** to **26**, long-answer type questions of **5** marks each.
- (vii) There is no overall choice in the question paper, however, an internal choice is provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any one of the two given alternatives.

SECTION-A

1. Write the dual purpose served by Deoxyribonucleoside triphosphates in polymerisation. **1**
2. Name two diseases whose spread can be controlled by the eradication of *Aedes mosquitoes*. **1**
3. How do cytokine barriers provide innate immunity in humans ? **1**
4. Write the names of the following :
 - (a) A 15 mya primate that was ape-like
 - (b) A 2 mya primate that lived in East African grasslands **1**
5. Mention the chemical change that proinsulin undergoes, to be able to act as mature insulin. **1**

SECTION-B

6. Your advice is sought to improve the nitrogen content of the soil to be used for cultivation of a non-leguminous terrestrial crop. **2**
 - (a) Recommend two microbes that can enrich the soil with nitrogen.
 - (b) Why do leguminous crops not require such enrichment of the soil ?
7. With the help of an algebraic equation, how did Hardy-Weinberg explain that in a given population the frequency of occurrence of alleles of a gene is supposed to remain the same through generations ? **2**

OR

Although a prokaryotic cell has no defined nucleus, yet DNA is not scattered throughout the cell. Explain.

8. How did a citizen group called Friends of Areata Marsh, Arcata, California, USA, help to improve water quality of the marshland using Integrated Waste Water Treatment ? Explain in four steps. **2**
9. You have obtained a high yielding variety of tomato. Name and explain the procedure that ensures retention of the desired characteristics repeatedly in large populations of future generations of the tomato crop. **2**
10. (a) Name the source plant of heroin drug. How is it obtained from the plant ?
 - (b) Write the effects of heroin on the human body. **2**

SECTION-C

11. Draw a diagram of a mature human sperm. Label any three parts and write their functions. 3
12. (a) Expand VNTR and describe its role in DNA fingerprinting. 3
(b) List any two applications of DNA fingerprinting technique. 3
13. Differentiate between Parthenocarp and Parthenogenesis. Give one example of each. 3
14. Medically it is advised to all young mothers that breastfeeding is the best for their newborn babies. Do you agree ? Give reasons in support of your answer. 3
15. Explain the mechanism of 'sex determination' in birds. How does it differ from that of human beings ? 3
16. (a) How has the development of bioreactor helped in biotechnology ?
(b) Name the most commonly used bioreactor and describe its working. 3
17. Explain the roles of the following with the help of an example each in recombinant DNA technology : 3
(a) Restriction Enzymes
(b) Plasmids
18. Explain out-breeding, out-crossing and cross-breeding practices in animal husbandry. 3
19. (a) Organic farmers prefer biological control of diseases and pests to the use of chemicals for the same purpose. Justify. 3
(b) Give an example of a bacterium, a fungus and an insect that are used as biocontrol agents.
20. (a) Differentiate between analogous and homologous structures. 3
(b) Select and write analogous structures from the list given below :
(i) Wings of butterfly and birds
(ii) Vertebrate hearts
(iii) Tendrils of bougainvillea and cucurbita
(iv) Tubers of sweet potato and potato
21. (a) "India has greater ecosystem diversity than Norway." Do you agree with the statement ? Give reasons in support of your answer.
(b) Write the difference between genetic biodiversity and species biodiversity that exists at all the levels of biological organisation. 3

OR

Explain the effect on the characteristics of a river when urban sewage is discharged into it.

22. How has the use of *Agrobacterium* as vectors helped in controlling *Meloidogyne incognita* infestation in tobacco plants ? Explain in correct sequence. 3

SECTION-D

- *23. Looking at the deteriorating air quality because of air pollution in many cities of the country, the citizens are very much worried and concerned about their health. The doctors have declared health emergency in the cities where the air quality is very severely poor.
(a) Mention any two major causes of air pollution.
(b) Write any two harmful effects of air pollution to plants and humans.
(c) As a captain of your school Eco-club, suggest any two programmes you would plan to organise in the school so as to bring awareness among the students on how to check air pollution in and around the school. 4

SECTION-E

24. (a) Describe any two devices in a flowering plant which prevent both autogamy and geitonogamy. 5
(b) Explain the events upto double fertilisation after the pollen tube enters one of the synergids in an ovule of an angiosperm.

OR

- (a) Explain menstrual cycle in human females.
(b) How can the scientific understanding of the menstrual cycle of human females help as a contraceptive measure ?
25. (a) Write the scientific name of the organism Thomas Hunt Morgan and his colleagues worked with for their experiments. Explain the correlation between linkage and recombination with respect to genes as studied by them.

*Note : From Academic Year 2018-19 CBSE has removed 'Value based Question' from the curriculum.

- (b) How did Sturtevant explain gene mapping while working with Morgan ? 5

OR

- (a) State the 'Central dogma' as proposed by Francis Crick. Are there any exceptions to it ? Support your answer with a reason and an example.
- (b) Explain how the biochemical characterisation (nature) of "Transforming Principle" was determined, which was not defined from Griffith's experiments. 5
26. (a) Following are the responses of different animals to various abiotic factors. Describe each one with the help of an example.
- (i) Regulate
 - (ii) Conform
 - (iii) Migrate
 - (iv) Suspend
- (b) If 8 individuals in a population of 80 butterflies die in a week, calculate the death rate of population of butterflies during that period. 5

OR

- (a) What is a trophic level in an ecosystem ? What is 'standing crop' with reference to it ?
- (b) Explain the role of the 'first trophic level' in an ecosystem.
- (c) How is the detritus food chain connected with the grazing food chain in a natural ecosystem ?

CBSE Marking Scheme (Issued by Board)

SECTION-A

1. Acts as a substrate , provide energy (from the terminal two phosphates). $\frac{1}{2} + \frac{1}{2}$ [1 mark]
2. Dengue, Chikunguniya // Yellow Fever / Eastern Equine Encephalitis / West Nile Fever / Zika / Zika Virus Disease (Any two) $\frac{1}{2} + \frac{1}{2}$ [1 mark]
3. Interferon (proteins) , secreted by virus infected cells (protect non - infected cells from further viral infection) $\frac{1}{2} + \frac{1}{2}$ [1 mark]
4. (a) Dryopithecus $\frac{1}{2}$
(b) Australopithecines / Australopithecus / Homo habilis [1/2 mark]

5. Removal of C - peptide (from pro-insulin).[1 mark]
[CBSE Marking Scheme, 2018]

Detailed Answer :

Insulin is synthesized as a pro-hormone, which needs to be processed before it becomes a fully mature and functional hormone. The pro-hormone is a single polypeptide chain with an extra stretch called the C peptide. This is removed during maturation.

SECTION-B

6. (a) Azospirillum / Azotobacter / Anabaena / Nostoc / Oscillatoria / Frankia (Any two correct names of microbes) $\frac{1}{2} + \frac{1}{2}$
(If cyanobacteria mentioned = $\frac{1}{2}$, but if along with cyanobacteria Anabaena / Nostoc / Oscillatoria mentioned then No mark on cyanobacteria)
- (b) They can fix atmospheric nitrogen , due to presence of Rhizobium / N_2 fixing bacteria in their root nodules $\frac{1}{2} + \frac{1}{2}$ [1+1=2 mark]

7. In a population of diploid organisms

If frequency of allele A = p and frequency of allele a = q $\frac{1}{2}$

Expected genotype frequency under random mating are

AA = p^2 (for the AA homozygotes)

aa = q^2 (for the aa homozygotes)

Aa = $2pq$ (for the Aa heterozygotes) $\frac{1}{2}$

(In absence of selection , mutation , genetic drift or other forces allelic frequency p and q are constant through generation)

Therefore $p^2 + 2pq + q^2 = 1$ 1 [2 marks]

[CBSE Marking Scheme, 2018]

OR

DNA is negatively charged , positively charged proteins , hold it in places , in large loops

(in a region termed as nucleoid) $\frac{1}{2} \times 4$ [2 marks]

[CBSE Marking Scheme, 2018]

Detailed Answer :

The Hardy-Weinberg model enables us to compare a population's actual genetic structure over time with the genetic structure we would expect if the population were in Hardy-Weinberg equilibrium (i.e., not evolving). If genotype frequencies differ from those we would expect under equilibrium, we can assume that one or more of the model's assumptions are being violated, and attempt to determine which one(s).

Hardy and Weinberg assigned the letter p to the frequency of the dominant allele A and the letter q to the frequency of the recessive allele a.

Since the sum of all the alleles must equal 100%, then $p + q = 1$. They then reasoned that all the

random possible combinations of the members of a population would equal $(p+q)^2$ or $p^2 + 2pq + q^2$.

The overall equation for the Hardy-Weinberg equilibrium is expressed in this way: $p^2 + 2pq + q^2 = 1$ [binomial expansion of $(p + q)^2$]

OR

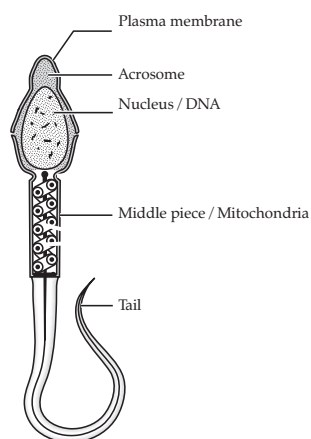
In prokaryotic cell, the DNA is not scattered throughout the cell but present in the form of a membrane less structure called nucleoid. The prokaryotic cells uses a specific mechanism to pack the genetic material tightly into this region.

The prokaryotic cello do take up a measure against this by folding the fibres and forming genophore.

8. (a) Water is treated by conventional method // sedimentation / filtration / chlorination.
(b) Water flows to six connected marshes.
(c) The water in marshes is seeded with appropriate plants / algae / fungi / bacteria.
(d) Which helps to neutralise the pollutants / assimilate the pollutants / absorb pollutants / Remove heavy metals. $\frac{1}{2} \times 4$ [2 marks]
9. (a) Tissue culture / micropropagation / somaclonal propagation / apomixis $\frac{1}{2}$
(b) Explant / any part of plant taken out and grown (in a test tube / vessel),
(c) under sterile condition,
(d) in special nutrient medium (containing carbon source / sucrose , inorganic salt vitamins / amino acids and growth regulator).
[$\frac{1}{2} \times 3$ [$\frac{1}{2} + 1\frac{1}{2} = 2$ marks]
10. (a) Papaver somniferum / Poppy plant. $\frac{1}{2}$
(b) Extracted from latex of the plant / acetylation of morphine (obtained from the latex of plant) $\frac{1}{2}$
(c) Depressant , slows down body function. $\frac{1}{2} + \frac{1}{2}$
[1 + 1 = 2 marks]

SECTION-C

11. Structure of a sperm : (Any three labelling)



Plasma membrane : Envelope of the sperm

Acrosome : Filled with enzyme that help fertilization of ovum

Mitochondria : Energy source for swimming

Middle Piece : Possess mitochondria which is the energy source for swimming

Tail : For movement of sperm

Nucleus : Containing chromosomal material

(Functions of the parts labelled) $\frac{1}{2} \times 3$
[$1\frac{1}{2} + 1\frac{1}{2} = 3$ marks]

12. (a) VNTR - (i) Variable Number of Tandem Repeat(s) $\frac{1}{2}$
(ii) used as a probe (because of its high degree of polymorphism) $\frac{1}{2}$
(b) Forensic science / criminal investigation (any point related to forensic science) / determine population and genetic diversities / paternity testing / maternity testing / study of evolutionary biology

(Any two) 1+1

[1 + 2 = 3 marks]

13. Differences between parthenogenesis and parthenocrapy :

Parthenogenesis	Parthenocrapy
New organism develops without fertilization. =1	Formation of fruit without fertilization. =1
e.g. Drones /male honey bee / turkey / rotifers / some lizards / any other correct example. = $\frac{1}{2}$	e.g. banana / grapes / any other correct example. = $\frac{1}{2}$

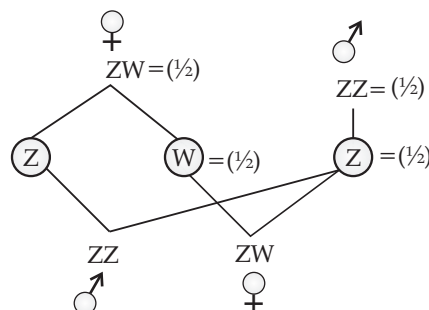
[$1\frac{1}{2} + 1\frac{1}{2} = 3$ marks]

14. Yes = 1 ,
provides nutrition (calcium , fats , lactose) / provides (passive) immunity / provides antibodies / Ig A (Any two) =1+1 [1+2=3 marks]
[CBSE Marking Scheme, 2018]

Detailed Answer :

Yes, breastfeeding is important for newborn babies. The milk produced during initial stages of lactation called colostrum is a rich source of antibodies. This antibodies protect the baby from external viral and bacterial infection. It also has a balanced nutrients, which is extremely beneficial for newborn babies. 3

15. In birds ;



Birds : female heterogamety / female produces (Z) type and (W) type of gametes = $\frac{1}{2}$

Humans : male heterogamety / male produces (X) type and (Y) type of gametes = $\frac{1}{2}$

[2 + 1 = 3 marks]

16. (a) Larger biomass / large volume of culture can be processed leading to higher yields of desired specific products (protein / enzymes), under controlled condition $\frac{1}{2} + \frac{1}{2}$
- (b) Stirring type $\frac{1}{2}$
- Mixing of reactor contents evenly (with agitator system or a stirrer) = $\frac{1}{2}$
 - Facilitates oxygen availability = $\frac{1}{2}$
 - Temperature/pH/foam control/under optimum conditions = $\frac{1}{2}$ [1 + 2 = 3 marks]
17. (a) It recognises a specific sequence of base pairs palindromes, and cuts the DNA strand at a specific site $\frac{1}{2} + \frac{1}{2}$
eg. EcoRI / Hind II or any other correct example $\frac{1}{2}$
- (b) Act as vectors / cloning of desired alien gene / foreign gene 1
eg. pBR322 / plasmid of Salmonella / plasmid of Agrobacterium / Ti Plasmid / Tumour inducing Plasmid $\frac{1}{2}$ [1½ + 1½ = 3 marks]
18. **Out breeding** : Breeding of unrelated animals (which may be between individual of same breed or between individuals of different species) = 1
Out crossing : (a kind of out breeding) Mating of animals within the same breed but having no common ancestors on either side of their pedigree upto 4 – 6 generations = 1
Cross breeding : (another type of out breeding) Superior males of one breed are mated with superior females of another breed = 1
[1 + 1 + 1 = 3 marks]
19. (a) (i) Reduces dependence on toxic chemicals.
(ii) Protects our ecosystem or environment.
(iii) Protects and conserves non-target organisms / they are species - specific.
(iv) These chemicals being non-biodegradable may pollute the environment permanently.
(v) These chemicals being non-biodegradable may cause biomagnification.
(Any three) = $\frac{1}{2} \times 3$
- (b) **Bacteria** : Bacillus thuringiensis = $\frac{1}{2}$
Fungus : Trichoderma = $\frac{1}{2}$
Insect : Ladybird / Dragonfly / Moth or any other correct example = $\frac{1}{2}$
[1½ + 1½ = 3 marks]
20. **Differences between analogous and homologous structures** :
- (a) **Analogous** : Anatomically not similar though perform similar functions / are a result of convergent evolution. = 1
Homologous : Anatomically similar (but perform different functions) / are a result of divergent evolution. = 1
- (b) Option (i) Wings of butterfly and birds / (iv) Tubers of sweet potato and potato (Any one) = 1
[2 + 1 = 3 marks]

21. (a) Yes $\frac{1}{2}$

India / tropical region : (i) are less seasonal / more constant / more predictable.

(ii) promote niche specialisation leading to greater bio-diversity.

(iii) Species diversity increases as we move towards equator.

(iv) More number of species exist.

Norway / temperate region : (i) more seasonal / less constant / less predictable.

(ii) do not promote niche specialisation leading to low bio-diversity.

(iii) Species diversity decreases as we move away from equator.

(iv) Less number of species exist. (Any one) = $\frac{1}{2}$

(b) (i) **Genetic diversity** : Diversity / variation within a species over its distributional range / same explained with the help of a correct example = 1

(ii) **Species diversity** : Diversity / variation at a species level / same explained with the help of a correct example. = 1 [1 + 2 = 3 marks]

OR

(a) Rise in organic matter, leads to increased microbial activity / growth of microbes = $\frac{1}{2} + \frac{1}{2}$

(b) It results in decrease in dissolved oxygen / rise in BOD / rise in Biochemical Oxygen Demand = 1

(c) Leads to fish mortality / algal bloom / colour change / foul odour / increase in toxicity (Any two) $\frac{1}{2} + \frac{1}{2}$
[1 + 1 + 1 = 3 marks]

[CBSE Marking Scheme, 2018]

Detailed Answer :

(a) Yes, India has greater ecosystem diversity than Norway. It is because India lies primarily in the tropical and sub-tropical zone while Norway lies near the Arctic region. This exposes the India to greater amounts of sunlight and thus greater level of ecosystem diversity.

(b) **Difference between genetic diversity and species diversity :**

Genetic diversity	Species diversity
It refers to the number of genes and their alleles found in organisms.	It refers to the number of species per unit area.
It increases as we move up the biological organization.	It may or may not increase to a greater extent as we move up the biological organization.

2+1

OR

When organic wastes from the urban sewage enter the water bodies, it serves as a food source for microorganisms such as algae and bacteria. As a result, the population of these microorganisms in the water body increases. Here, they utilize most

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of the dissolved oxygen for their metabolism. This results in increase in the levels of Biodegradable oxygen demand (BOD) in river water and results in the death of aquatic organisms. Also, the nutrients in the water lead to the growth of planktonic algae, causing algal bloom. It imparts a distinct colour to the water bodies and deteriorates the water quality resulting in death of fishes. Some bloom-forming algae are extremely toxic to human beings and animals. **3**

22. (a) Using Agrobacterium vector nematode specific genes introduced into host plant
 (b) Sense and antisense strands of mRNA are produced
 (c) ds RNA is formed
 (d) ds RNA initiates RNAi
 (e) Prevents translation of mRNA / silencing of mRNA of parasite / nematode
 (f) Parasite will not survive $[\frac{1}{2} \times 6 = 3 \text{ marks}]$

SECTION-D

23. (a) Vehicular discharge / smoke from industries / burning of agricultural wastes / smoke from incinerator / dust / smoke from thermal plants or any other correct cause. **(Any two) = $\frac{1}{2} + \frac{1}{2}$**
 (b) Reduces growth of plants / reduces yields of crops / premature death of plants / respiratory problems / acid rain / any other relevant point. **(Any two - one from plant and one from human) = 1 + 1**
 (c) Plantation drive / awareness programmes through posters / nukkad natak / film show / rallies / debates or any other. **(Any two) = 1 + 1**
[1 + 1 + 2 = 4 marks]

SECTION-E

24. (a) (i) Dioecy / production of unisexual flowers (in different plants)
 (ii) Self incompatibility **= 1 + 1**
 (b) (i) Pollen tube releases 2 male gametes in the cytoplasm of synergid
 (ii) One male gamete fuses with egg cell synergid, resulting in diploid zygote
 (iii) Other male gamete fuses with polar nuclei / triple fusion, to form triploid PEN (Primary Endosperm Nucleus) / PEC (Primary Endosperm Cell) **= 1 × 3 [2 + 3 = 5 marks]**

OR

- (a) (i) **Menstrual Phase** : Menstrual flow occurs / due to breakdown of endometrial lining of uterus, when fertilization does not occur.
 (ii) **Follicular Phase** : Primary follicles grow into mature graafian follicles and endometrium regenerates through proliferation, changes induced by pituitary and ovarian hormones.
 (iii) **Ovulatory Phase** : LH surge, induces rupture of graafian follicle and release of secondary oocyte /

ovum during middle of cycle (i.e. 14th day).

- (iv) **Luteal phase** : Ruptured graafian follicle transforms into corpus luteum which secrete large amount of progesterone, essential for maintaining endometrium. **1 × 4**
 (b) Because ovulation occurs during mid cycle chances of fertilisation are very high so, couples should abstain from coitus between day 10 - 17.
 $\frac{1}{2} + \frac{1}{2}$

25. (a) *Drosophila melanogaster* = 1

They observed that two genes (located closely on a chromosome) did not segregate independently of each other (F_2 ratio deviated significantly from 9 : 3 : 3 : 1). $= \frac{1}{2}$
 Tightly linked genes tend to show fewer (lesser) recombinant frequency of parental traits / show higher (more) frequency of parental type. $= \frac{1}{2}$

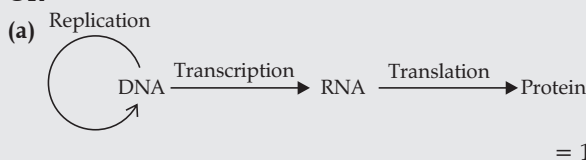
Loosely linked genes show higher percentage (more) of recombinant frequency of parental traits / lower frequency percentage of parental type. $= \frac{1}{2}$

Genes present on same chromosome are said to be linked and the recombinant frequency depends on their relative distance on the chromosome. $= \frac{1}{2}$

(b) He used the frequency of recombination between gene pairs on the same chromosome, as a measure of the distance between genes and mapped their position on the chromosome. **= 1 + 1**

[3 + 2 = 5 Marks]

OR



Yes, in some viruses flow of information is in reverse direction / reverse transcription $= \frac{1}{2} + \frac{1}{2}$

e.g. Any Retrovirus / HIV $= \frac{1}{2}$

(b) Protein and DNA and RNA were purified from heat killed S strain / smooth Streptococcus / Diplococcus pneumoniae $= \frac{1}{2}$

Protein + Protease \rightarrow transformation occurred (R cell to S type) $= \frac{1}{2}$

RNA + RNA ase \rightarrow transformation occurred (R cell to S type) $= \frac{1}{2}$

DNA + DNA ase \rightarrow transformation inhibited $= \frac{1}{2}$

Hence DNA alone is the transforming material $= \frac{1}{2}$

[2 + 3 = 5 marks]

[CBSE Marking Scheme, 2018]

Detailed Answer :

- (a) Thomas Hunt Morgan and his colleagues used fruit fly, or *Drosophila melanogaster* to study linkage.

Morgan carried out several dihybrid crosses in *Drosophila* to study sex-linked genes. In one such experiment, he crossed yellow-bodied, white-eyed females with brown-bodied, red-eyed males (wild type). He found that the

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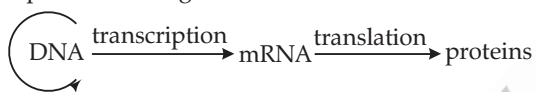
two genes did not segregate independently of each other and the F_2 ratio deviated from the 9:3:3:1 ratio, (expected when the two genes are independent).

Morgan attributed this due to the physical association or linkage of the two genes and coined the term linkage. He stated that higher the linkage between two genes, lesser are the chances of recombination.

- (b) Alfred Sturtevant used the recombination frequency between gene pairs as a measure of physical distance between genes and 'mapped' their position on the chromosome. This process of mapping the gene positions was termed as gene mapping, which are used today for genome sequencing projects as in Human Genome Project. **3+2**

OR

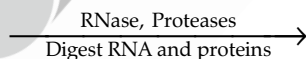
- (a) Central dogma, proposed by Francis Crick states that the genetic information flows from DNA to RNA through transcription and from RNA to proteins through translation.



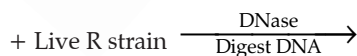
Yes, there are some exceptions to this process. In some viruses, the genetic material is in the form of RNA. In such cases, the direction of genetic information flow is reversed. The RNA is first converted into DNA through the process, reverse transcription. The DNA thus formed, follows the usual path of central dogma i.e. it first converts into RNA, which is then translated into proteins. An example of organism exhibiting reverse transcription is *Influenza A virus*.

- (b) Biochemical characterization of transforming principle was discovered by Oswald Avery, Colin MacLeod and Maclyn McCarty
- They worked to determine the biochemical nature of 'transforming principle' in Griffith's experiment.
 - They purified biochemicals (proteins, DNA, RNA etc.) from the heat killed S cells to see which one could transform live R cells into S cells.

Heat-killed S strain + Live R strain



Transformation occurs Heat-killed S strain



Transformation does not occur and mouse survives

- They discovered that :
 - DNA alone is transformed.
 - Proteases and RNases did not affect transformation.

- Digestion with DNase inhibited transformation, suggesting that the DNA caused the transformation.

Thus, they concluded that DNA is the hereditary material. **2+3**

26. (a) (i) **Regulate** : Maintain constant internal temperature/osmotic concentration/homeostasis. = $\frac{1}{2}$
e.g. birds / mammals. = $\frac{1}{2}$

(ii) **Conform** : Do not maintain constant internal temperature / osmotic concentration / No homeostasis. = $\frac{1}{2}$
e.g. any one example of animal other than birds and mammals. = $\frac{1}{2}$

(iii) **Migrate** : Temporary movement of organisms from the stressful of habitats to hospitable areas and return when stressful period is over. = $\frac{1}{2}$
e.g. birds from Siberia / or any other correct example. = $\frac{1}{2}$

(iv) **Suspend** : Reducing / minimising the metabolic activities during unfavourable conditions. = $\frac{1}{2}$
e.g. Polar bear / amphibian / snails / fish / any other example of animals. = $\frac{1}{2}$

(b) Death rate = $\frac{8}{80} = 0.1$ individuals per butterfly per week. = $\frac{1}{2} + \frac{1}{2}$ **[4 + 1 = 5 marks]**

OR

(a) Specific place of an organism in a food chain, mass of living material (biomass) at each trophic level at a particular time. = **1+1**

(b) First trophic level has producers / autotrophs, which trap solar energy / to produce food (photosynthesis). = **1+1**

(c) Organisms of the Detritus food chain (DFC) are the prey to the Grazing food chain (GFC) organism, the dead remains of GFC are decomposed into simple inorganic materials which are absorbed by DFC organisms. = $\frac{1}{2} + \frac{1}{2}$ **[2 + 2 + 1 = 5 marks]**

[CBSE Marking Scheme, 2018]

Detailed Answer :

(a) (i) **Regulate** : Certain animals have the ability to maintain a constant temperature and constant osmolality to keep up their homeostasis. For example, mammals have a constant body temperature (37°C) irrespective of the outside temperature. In summers, to maintain the temperature, they sweat and in winters they shiver to produce heat.

(ii) **Conform** : About 99% of animals and nearly all plants cannot maintain a constant internal environment. Their body temperature or osmotic concentration change with the surrounding conditions. They are called conformers. Hence, the internal environment of conformers changes with external environment. For example, in aquatic animals, osmotic concentration of body fluids changes with that of the ambient osmotic concentration.

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(iii) **Migrate** : It is the temporarily movement from a stressful habitat to a more hospitable area and return when stressful condition is over. For example, during winter, Keolado National Park (Bhartpur, Rajasthan) hosts migratory birds coming from Siberia and other extremely cold northern regions.

(iv) **Suspend** : In bacteria, fungi and lower plants, thick walled spores are formed which help them to overcome stressful, unfavourable conditions. Spores germinate when conditions are favourable.

(b) Death rate in the population during that period is calculated as: $8/80 = 0.1$ death/week **4+1**

OR

(a) A specific place of organisms in the food chain is known as their trophic level. Producers belong to the first trophic level, herbivores to the second and carnivores to the third.

Each trophic level has a certain mass of living material at a particular time called as the standing crop. Standing crop is the quantity or total weight of dried biomass of the organism which is present in a specific location at a particular time. It is measured as the mass of living organisms (biomass) or the number in a unit area.

(b) The first trophic level is the producer. At this level, the organisms are autotrophic. They prepare their own food with the help of sunlight. Producers have the ability to transform light energy into chemical energy so that it can be useful to other trophic levels and for the sustenance of the ecosystem.

(c) In detritus food chain, energy comes from organic matter generated in trophic levels of the grazing food chain. **2+2+1**

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