

Question Paper Code 57/1/3

SECTION – A

Q. Nos. 1 - 5 are of one mark each

1. Name the two enzymes that are essential for constructing a recombinant DNA.

Ans. Restriction enzymes / polymerase enzymes / ligase

(Any Two) = $\frac{1}{2} + \frac{1}{2}$

[1 mark]

2. Name the host where fertilisation occurs in the life cycle of Plasmodium.

Ans. Female Anopheles Mosquito

[1 mark]

3. Name the disorder caused due to the absence of one of the X-chromosomes in a human female.

Ans. Turner's syndrome

[1 mark]

4. List any two characters of Pea plants used by Mendel in his experiments other than height of the plant and the colour of the seed.

Ans. Flower colour / Flower position / Pod shape / Pod colour / Seed shape (Any two) = $\frac{1}{2} + \frac{1}{2}$

[1 mark]

5. Provide an example each of single celled organisms which reproduce by :

(i) binary fission

(ii) budding

Ans. (i) Amoeba / Paramecium = $\frac{1}{2}$

(ii) Yeast = $\frac{1}{2}$

SECTION-B

6. "Niche is a part of a habitat." Explain with the help of an example.

Ans. A single habitat may have different kind of organisms in it but within the habitat every organism has defined range of condition that it can tolerate, resources it utilises and plays a distinct functional role - all these together comprise its niche, for example pond is a habitat for variety of plants and animals, but in it Gambusia fish is found in its peripheral parts which is its niche. (Any other suitable example with explanation) = $\frac{1}{2} \times 4$

[2 marks]

7. For a layman, both apples and mangoes are 'fruits'. Do you agree? Give reasons in support of your answer.

Ans. No = 1

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Apple - thalamus , (false fruit) = ½

Mango - Ovary , (true fruit) = ½

[1 + 1 = 2 marks]

8. State the role of T-lymphocytes and B-lymphocytes in developing acquired immunity against certain diseases.

Ans. T-lymphocytes - help B-lymphocytes to produce antibodies / mediate CMI (Cell Mediated Immunity) = 1

B-lymphocytes - produce antibodies into blood to fight antigens = 1

[1 + 1 = 2 marks]

9. Name and state the effect of a drug that is often medically prescribed, but its overuse leads to drug dependence and drug abuse.

Ans. Morphine / barbiturates / amphetamines / benzodiazepines / lysergic acid diethyl amides (LSD) = 1

Affects the central nervous system / acts as a pain killer / acts as a sedative / treats depression / treats insomnia / creates hallucinogenic effect

(Any two) = ½ + ½

[1 + 1 = 2 marks]

10. State the roles of AUG codon at 5' end and UAG at 3' end of a certain m-RNA during translation.

Ans. AUG codon at 5' end - start codon (for translation) / codes for methionine = 1

UAG codon at 3' end - stop codon (for translation) / terminate polypeptide chain = 1

[1 + 1 = 2 marks]

OR

'Degenerate' and 'Universal' are salient features of a genetic code. Explain.

Ans. Degenerate - Some aminoacids are coded by more than one codon = 1

Universal - one codon shall code for the same amino acid in all organisms (UUU would code for phenylalanine from bacteria to human beings) = 1

[1 + 1 = 2 marks]

11. Expand 'ELISA'. Why is this method preferred over conventional methods of diagnosis of diseases ?

Ans. Enzyme Linked Immunosorbent Assay = 1

Infection by pathogen detected by the presence of antigens (protein , glycoprotein etc.) / antibodies synthesised against the pathogen = 1

Conventional methods cannot provide early diagnosis which is made possible by ELISA = 1

[1 + 1 + 1 = 3 marks]

12. State the objective with which a dairy farm is set up. Describe the essential steps to be followed for dairy farm management.

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Ans. Processes and systems that increase yield and improve quality of milk / Selection of good breeds having high yielding potential and resistance to diseases / House to have adequate water and kept disease free / Feeding in a scientific manner with quality and quantity fodder / Storage and transport of milk and products / Regular inspection with proper record keeping / Regular visits of veterinary doctor

$$(Any\ six) = \frac{1}{2} \times 6 = 3$$

[3 marks]

13. Are humming birds and fish regulators or conformers? Give reasons in support of your answer.

Ans. Conformers = $\frac{1}{2}$

Heat loss or gain is a function of surface area = $\frac{1}{2}$

Since small animals have a larger surface area (relative to their volume), they tend to lose body heat very fast when it is cold outside, they have to expend much energy, to generate body heat through metabolism = $\frac{1}{2} \times 4 = 2$ / (cannot maintain a constant body temperature)

[1 + 2 = 3 marks]

14. (a) Why is Taq polymerase used instead of ordinary DNA polymerase in polymerase chain reaction (PCR)? Name the source organism of Taq polymerase.

(b) What is PCR used for?

Ans. (a) It is thermostable / remains active during the high temperature induced denaturation of (double stranded) DNA, (bacterium) *Thermus aquaticus* 1

(b) To obtain multiple copies of the gene (or DNA) of interest = 1

[2 + 1 = 3 marks]

15. (a) What is green revolution? Mention the steps that led to it.

(b) Name the scientist whose contribution led to development of semi-dwarf wheat varieties in India.

Ans. (a) Dramatic increase in food production (wheat and rice) during the mid 1960's is termed as Green Revolution = 1

Various plant breeding techniques / better management practices / use of agrochemicals (fertilizers and pesticides) (Any two) = $\frac{1}{2} + \frac{1}{2}$

(b) Norman E. Borlaug = 1

[1 + 1 + 1 = 3 marks]

16. GM plants are useful in many ways. How would you convince farmers to grow GM plants on their field? Explain giving three reasons.

Ans. Make crop more tolerant to abiotic stresses / Reduce reliance on chemical pesticides / Help to reduce post harvest losses / Increase efficiency of mineral usage / Enhance nutritional value of food (Any three)

[1 × 3 = 3 marks]

17. Explain with the help of an example each, male and female heterogamety mechanisms of sex determination.

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Ans. Male produces 2 different types of gametes

XO - e.g. grasshopper /

XY e.g. human, it is the type of sperm fertilising the egg that determine the sex of the offspring
= $1 + \frac{1}{2}$

Female produces 2 different types of gametes

ZW eg. : Birds, it is the type of egg getting fertilised with the sperm that determine the sex of the chick = $1 + \frac{1}{2}$

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

18. Name the male accessory glands in humans and write their functions.

Ans. (Paired) seminal vesicles, prostate, bulbourethral glands (paired) = $\frac{1}{2} \times 3$

Functions - Secretions constitute the Seminal plasma, which is rich in fructose / calcium and certain enzymes, lubrication of penis = $\frac{1}{2} \times 3$

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

19. When Morgan conducted dihybrid cross on Drosophila like Mendel did with pea plants, the F_2 ratios deviated significantly from that of Mendel's F_2 ratio. Write the explanation Morgan and his group gave to the observations they obtained from their experiment.

Ans. - When two genes in a dihybrid cross were located on the same chromosome they did not segregate independently = 1

- The proportion of parental gene combinations were much higher than non parental combinations / recombinants = 1

- Physical association of two genes was termed linkage = 1

[$1 \times 3 = 3$ marks]

20. Some microbes act as very good biofertilisers. Explain with the help of three suitable examples.

Ans. Rhizobium - Symbiotically fix atmospheric nitrogen into organic forms which can be used by the plant as nutrients

Azospirillum / Azotobacter - free living bacteria fix atmospheric nitrogen

Glomus / Fungi - Symbiotic with plants absorbs phosphorus from soil and passes it to plant

Cyanobacteria / Anabaena / Nostoc / Oscillatoria - fix atmospheric nitrogen in aquatic and terrestrial environment

Blue green algae - add organic matter to soil and increase soil fertility

(Any three) = 1×3

[3 marks]

21. (a) Name a terminal method to prevent pregnancy in humans.

(b) Describe the procedure of the terminal method carried in human male and female.

Ans. (a) Surgical methods / Sterilisation = 1

(b) Males - Vasectomy, a small part of vas deferens is removed or tied up through a small

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incision on the scrotum = $\frac{1}{2} + \frac{1}{2}$

Females - Tubectomy , a small part of the fallopian tube is removed or tied up through a small incision in abdomen or through vagina = $\frac{1}{2} + \frac{1}{2}$

[1 + 1 + 1 = 3 marks]

OR

- (a) Do all pollen grains remain viable for the same length of time ? Support your answer with two suitable examples.
- (b) How are pollen grains stored in pollen banks ? State the purpose of storing pollen grains in these banks.

Ans. (a) No = 1

Examples :

- (i) Cereals / rice / wheat - pollen grains / loose viability with in thirty minutes of their release = $\frac{1}{2}$
- (ii) In some members of Rosaceae / leguminoseae / Solanaceae maintain viability for months = $\frac{1}{2}$
- (b) Using cryopreservation techniques / in liquid nitrogen (-196° C) = $\frac{1}{2}$
- Maintaining viability / preserving threatened species / preserving commercially important plants / to be used for crop breeding programmes = $\frac{1}{2}$

[1 + 1 + 1 = 3 marks]

22. Write in what context did Darwin use the terms 'fitness', 'survival' and 'selection' while elaborating on the mechanism of evolution.

Ans. Fitness refers to reproductive fitness (will leave more progeny) - more survival and hence selected by nature - natural selection = 1×3

[3 marks]

Section-D

23. Waste Disposal and Waste Management poses a major problem in present times. Generation of garbage and its disposal is a major threat and consequently leads to severe environmental issues. The problem is not with biodegradable and recycled wastes. We realise that the need is to reduce non-biodegradable wastes.

- (a) Why is there a great concern of managing non-biodegradable waste in comparison to biodegradable waste ? Explain.
- (b) As a member of eco club of your school, suggest any two ways that you will discuss with your fellow members to organise for a "Zero garbage day" once in a month in the school.

Ans. (a) In comparison to biodegradable waste non biodegradable waste pollute the soil and also underground water = 1

Such waste stays for a very long time without degradation in the environment = 1

- (b) (i) Avoid use of plastics in packaging for milk and water /
- (ii) Avoid use of plastics in packaging for fruits and vegetables /

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(iii) Any other correct valid point

(Any two) = 1 + 1

[1 × 4 = 4 marks]

Section-E

24. (a) How are polygenic inheritance and multiple allelism different? Explain with the help of an example each.
- (b) List the criteria a chemical molecule must fulfill to be able to act as a genetic material.

Ans. (a) **Polygenic Inheritance**

Controlled by three or more genes

Example

A - B - C gene control human skin colour

Multiple allelism

More than two alleles govern the same character

Example

ABO blood grouping in humans = 2

- (b) - It should be able to generate its replica / replication
- It should be chemically and structurally stable
- It should provide the scope for slow changes / mutation that are required for evolution
- It should be able to express itself in the form of a Mendelian characters.

(Any three) = 1 × 3

[2 + 3 = 5 marks]

OR

State the hypothesis proposed by Oparin and Haldane. How was it experimentally proved by S.L. Miller? Explain.

Ans. The first form of life could have come from pre-existing non living organic molecules (RNA, protein etc.), and that formation of life was preceded by chemical evolution / formation of diverse organic molecule from inorganic constituents, the condition on earth were high temperature (Volcanic storms) reducing atmosphere (containing CH_4 , NH_3 , etc), Miller in his experiment created electric discharge in a closed task, containing CH_4 , H_2 , NH_3 and water vapour at 800°C , and observed the formation of aminoacids / organic compounds, which supported chemical evolution.

[$\frac{1}{2} \times 10 = 5$ marks]

25. What does an Ecological Pyramid indicate? Explain the three different types of upright Pyramids in nature with the help of an example each.

OR

(a) **Indiscriminate human activities** Ans. It indicates food / energy relationship between organisms at different trophic levels = $\frac{1}{2}$

(i) **Pyramid of Number** = example grassland ecosystem = $\frac{1}{2}$

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↓

Producers are more in number than herbivores carnivores

(ii) Pyramid of Biomass example = forest / tree ecosystem = ½

↓

Producers have more biomass than herbivores / carnivores

//

Pyramid of biomass shows a sharp decrease in biomass in higher trophic levels

(iii) Pyramid of energy = example. grassland ecosystem = ½

↓

Producers have more energy than herbivores / carnivores

[5 marks]

OR

(a) **Indiscriminate human activities such as alien species invasion, fragmentation and habitat loss have accelerated the loss of biodiversity. Justify by taking one example for each.**

(b) **State the importance of (i) IUCN Red data list and (ii) Hot spots in conservation of biodiversity.**

Ans. (a) Alien species invasion

When alien species are introduced unintentionally / deliberately for whatever purpose , some of them turn invasive and cause decline / extinction of indigenous species

eg.

- the introduction of African catfish / *Clarias gariepinus* (for aquaculture purpose) poses a threat to indigenous catfishes in our rivers
- The Nile perch introduced into lake Victoria in East Africa led to the extinction of more than 200 species of Cichlid fish in the lake
- Carrot grass / Parthenium , Lantana , Water hyacinth / Eichhornia poses a threat to indigenous species

Fragmentation

When large habitats are broken up into small fragments due to various human activities - mammals / birds requiring large territories and certain animals with migratory habits are badly affected

Habitat Loss

The Amazon rain forest is being cut and cleared for cultivating soyabeans / conversion to grasslands for raising cattle

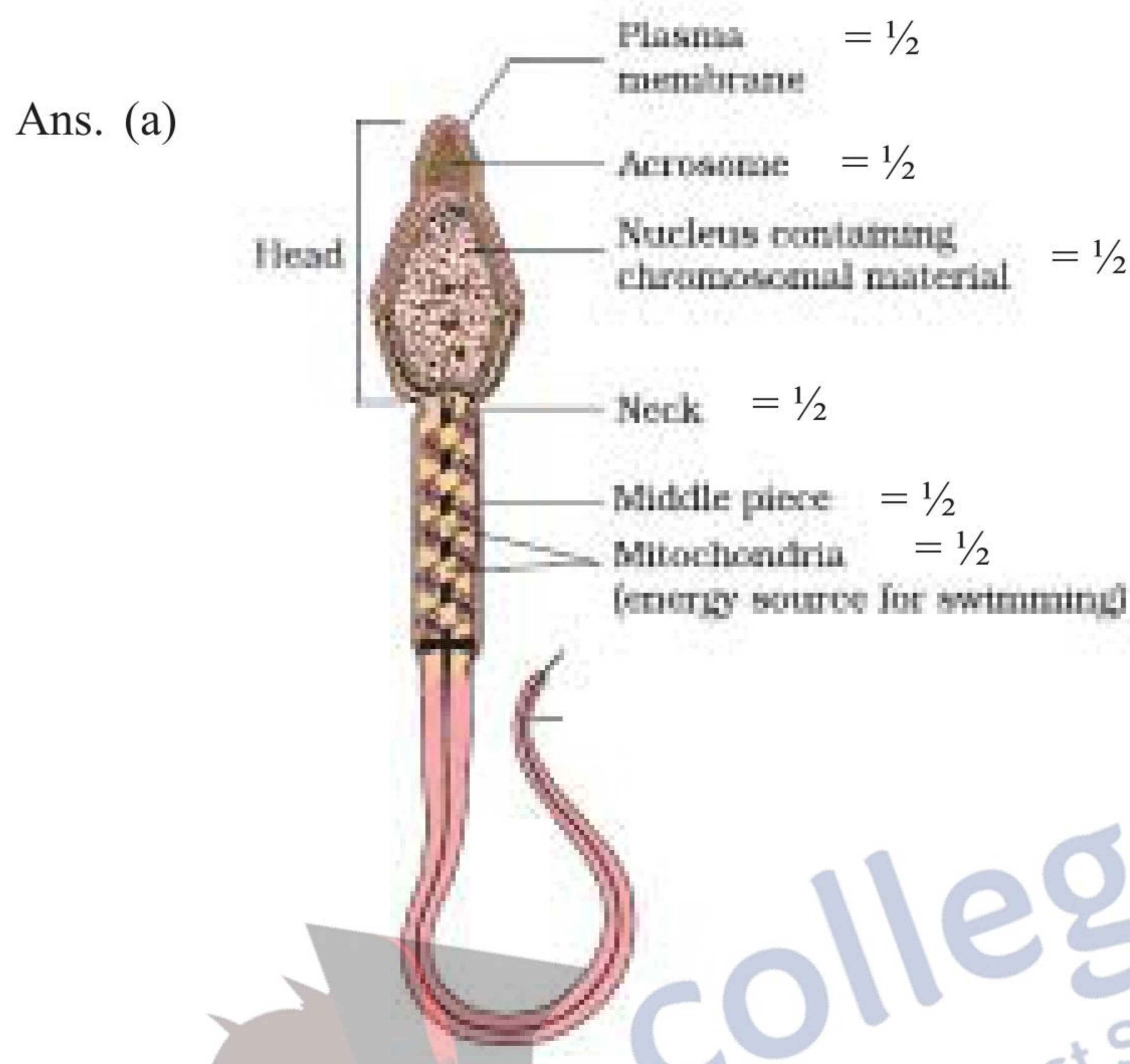
- (b) (i) Provides information of extinction of species
- (ii) Regions with very high levels of species richness , high degree of endemism / species confined to that region and not found anywhere else are identified which

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need to be conserve all priority basis.

26. (a) Draw a diagram of a human sperm. Label the different components in its head and middle piece region.
- (b) Explain the process of fertilisation in human female.



Any 6 correct labelling in head and middle piece = $\frac{1}{2} \times 6$

- (b) A sperm comes in contact with zona pellucida layer of ovum and induces changes in the membrane that block the entry of additional sperms, secretions of acrosome help the sperm to enter into cytoplasm of ovum (through zona pellucida and plasma membrane), this induces completion of unequal meiotic division of secondary oocyte which leads to formation of a second polar body and haploid ovum, soon haploid nucleus of sperm and ovum fuse to form zygote (fertilization) = $\frac{1}{2} \times 4$

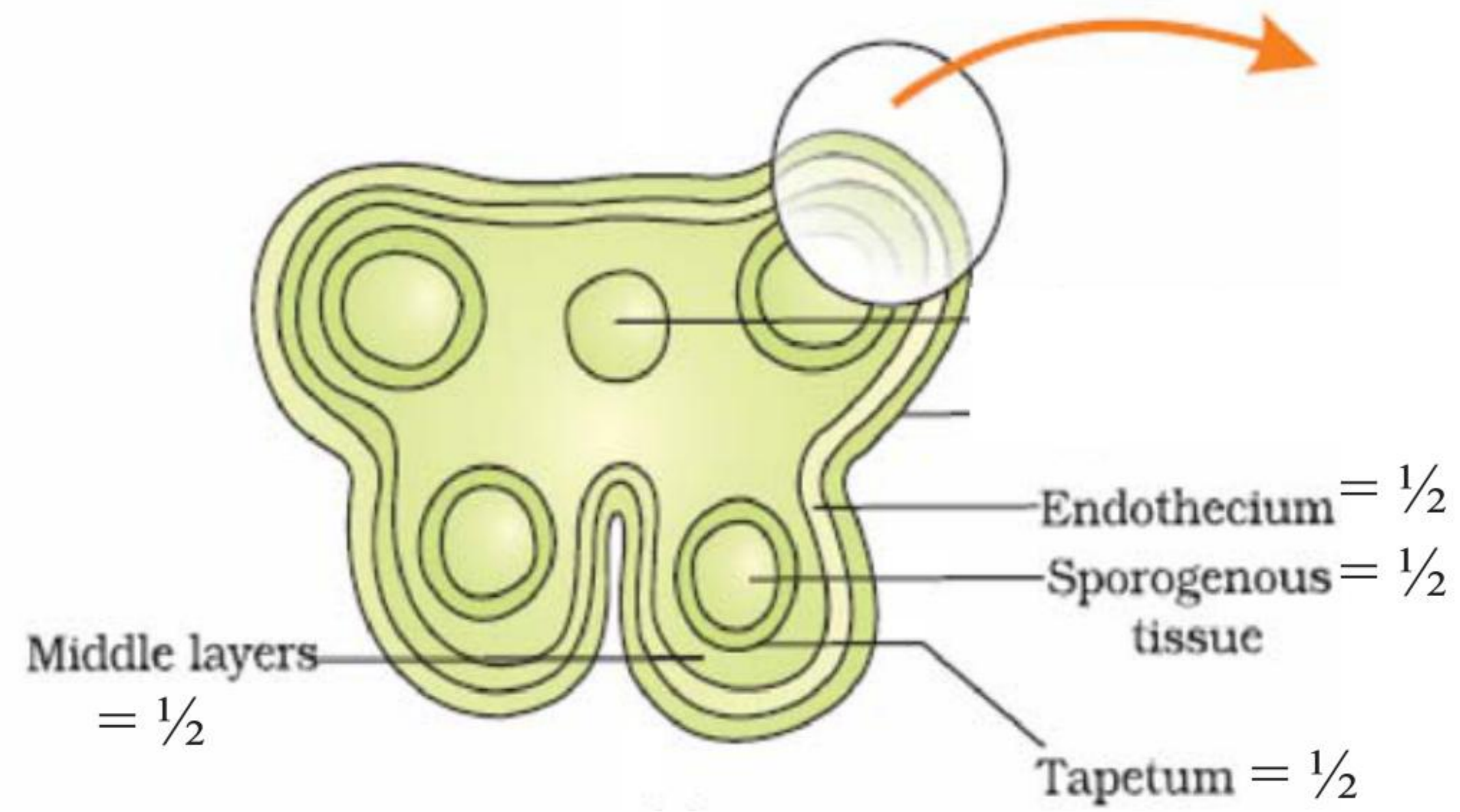
[3 + 2 = 5 marks]

OR

- (a) Draw a schematic transverse section of an anther of an angiosperm and label the following parts :
- Sporogenous tissue
 - Tapetum
 - Endothecium
 - Middle layers
- (b) Describe the special characteristic features of wind pollinated flowers.

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Ans. (a)



(b) Pollen grain light , nonsticky , well exposed stamens , feathery stigma , a single ovule in each ovary , numerous flowers packed into inflorescence , flowers non-colourful

(Any three) = 1×3

[2 + 3 = 5 marks]



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