ISC SEMESTER 2 EXAMINATION
SAMPLE PAPER - 4
BIOLOGY PAPER 1 (THEORY)

Maximum Marks: 35

Time allowed: One and a half hour

*Candidates are allowed an additional **10 minutes** for **only** reading the paper.*
*They must **NOT** start writing during this time.*

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*Internal choices have been provided in **one** question in **Section B***
*and **one** question in **Section C**.*

Section-A

Question 1

(i) Where the head office of IUCN is located?

(ii) The function of a restriction enzyme in recombinant technology is to:
  (a) Separate fragments of DNA by their length and electrical charge
  (b) Cut DNA into many fragments
  (c) Link together newly formed fragments of DNA
  (d) Make millions of copies of a specific segment of DNA

(iii) **Assertion:** In malaria, a person experiences chills and high fever recurring every three to four days.
Reason: This is caused by the release of haemozoin with rupture of liver cells.
  (a) Both assertion and reason are true and reason is the correct explanation of assertion.
  (b) Both assertion and reason are true but reason is not the correct explanation of assertion.
  (c) Assertion is true but reason is false.
  (d) Both assertion and reason are false.

(iv) Write the percentage of main green house gases present in the atmosphere.

(v) Expand HLA and MALT.

(vi) Why fruit juices in bottles brought from market is clearer than those made at home?

(vii) The interaction between a whale and the barnacles growing on its back is called_____.

Section-B

Question 2

How are insect pest resistant varieties develop?

Question 3

Why should one take an immunosuppressant agent all through his life after organ transplantation?

Question 4

Give one word:

(i) Movement of arctic tern in summer and autumn.

(ii) Maximum size of the population that can be supported in a given habitat.

Question 5

Name two types of ecosystem that are (i) highly productive (ii) least productive.

Question 6

Explain the steps that are involved in hybridization.

Question 7

Write the role of 'Ori' and ' Restriction site' in a cloning vector pBR322.

Question 8

(i) While doing PCR, the denaturation step is missed. What will be its effect on the process?

OR

(ii) What is the meaning of sticky ends in biotechnology?

Question 9

Briefly explain metapopulation.

Section-C

Question 10

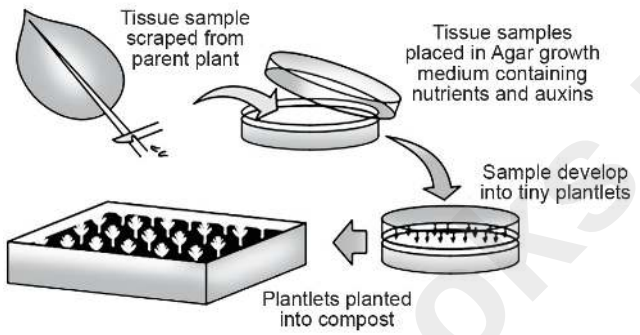
State the difference between primary succession and secondary succession.

Question 11

Define plant introduction and acclimatization.

Question 12

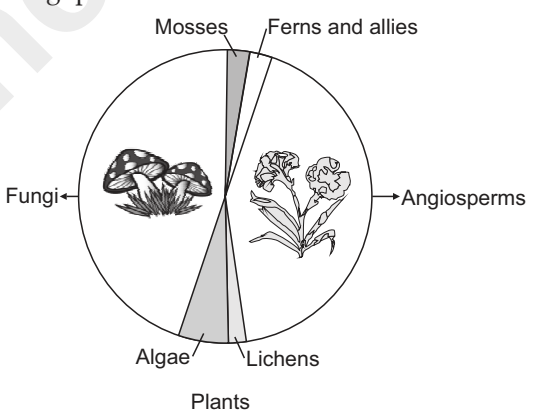
Given below is the figure of an important technique of plant biotechnology, based on it answer the following questions:



(i) Name the technique described in the figure.
(ii) Define callus.
(iii) Name the growth hormone used for initiating rooting.
(iv) Name the growth hormone used for initiating shooting.
(v) Define the term 'Totipotency'.
(vi) Give the term for plant material used to initiate the process.

Question 13

Given below is the diagrammatic representation of global diversity of major taxa of plants. Based on the diagram, answer the following questions:



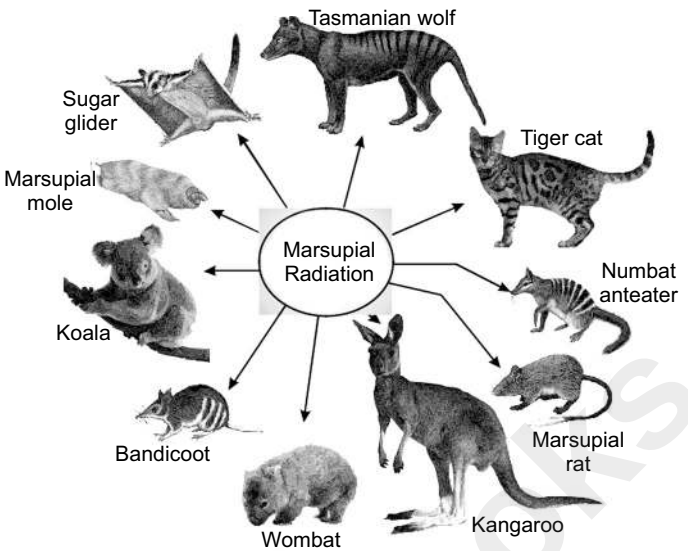
(i) Which is the most endangered plant among all the categories?
(ii) What is the reason for its endangerment?
(iii) Which is the most advanced and primitive group of plants?
(iv) How fungi has been able to sustain itself?

OR

(i) To which geographical region, these organisms belong?

(ii) What led to the evolution of such diverse species? Explain.

(iii) Explain how placental wolf and Tasmanian wolf share the same habitat.



Answers

Section-A

Answer 1.

(i) Head office of IUCN is located in Morges, Switzerland.

(ii) (b) Cut DNA into many fragments

(iii) (c) Assertion is true but reason is false.

Explanation :

Malignant malaria caused by Plasmodium falciparum is the most serious one and can even be fatal. The parasites initially multiply within the liver cells and then attack the red blood cells (RBCs) resulting in their rupture. The rupture of RBCs is associated with release of a toxic substance, haemozoin, which is responsible for the chill and high fever recurring every three to four days.

(iv) Carbon dioxide: 60%, CFCs: 14%, CH_4: 20% and N_2O: 6%.

(v) HLA: Human Leukocyte Antigen.
MALT: Mucosal Associated Lymphoid Tissue.

(vi) Bottle juices are clarified by the addition of pectinase and proteases.

(vii) Commensalism.

Section-B

Answer 2.

Agricultural crops are more prone to insect pests and cause considerable destruction. The host crop has certain physiological, morphological or biochemical features, due to which insect pests are interrupted from colonising the crop. Such features may be, for example, the hairy leaf surface of the cotton plant hinders the Jassids.

Another such example is the leaf beetle on the wheat crop. Sources of resistant genes may be cultivated and propagated and selected among the germplasm. So the breeding mechanism to produce insect pest-resistant crops follows the steps as under :

1. Collection of germplasm
2. Selection of parents with desired traits
3. Crossing
4. Crossing of F_1 progeny
5. Collecting the desired progenies
6. Release of a new variety.

Answer 3.

The body is able to differentiate the self and non-self at any time and reject the grafted part, hence immunosuppressants are needed throughout the life after organ transplant.

Answer 4.

(i) Migration.

(ii) Carrying capacity.

Answer 5.

1. Highly productive ecosystem is Tropical rainforests and coral reefs.
2. The least productive ecosystem is Tundra and deserts ecosystem.

Answer 6.

Following steps are involved in hybridisation:

1. **Selection:** Select the plants which are to be used as parents.
2. **Evaluation of parents:** Parents if new to the region then must be evaluated for their adaptability.
3. **Sowing plant:** If flowering duration of both plants is same then simultaneous sowing of both of them can be done, otherwise staggered sowing is to be carried out.
4. **Emasculation:** To do self-pollination without affecting of female reproductive system kill or removing pollen grains of a flower.
5. **Bagging:** The emasculated flower is immediately bagged to avoid pollination by any other foreign pollen.
6. **Tagging:** The emasculated, artificially pollinated bagged flowers are tagged. The tag contains name of the parent plant name, time and date of emasculation.
7. **Harvesting and storing the F_1 seeds:** On maturity the seed develop after crossing are harvested, dried and stored.

Answer 7.

Role of Ori sequence and restriction site in pBR322: Ori is a genetic sequence that acts as the initiation site for replication of DNA when any fragment linked to this sequence can be initiated to replicate within host cells. Ori is also responsible for controlling copy numbers. Recognition site is the specific DNA sequences that contain different palindromic sequences, as recognised by respective restriction enzymes (such as EcoRI, Hind III, PvuI, BamHI etc.). Recognition sites are sequences where the restriction enzymes cut the DNA. It is the site of ligation of alien DNA in one of the two antibiotic resistance sites.

Answer 8.

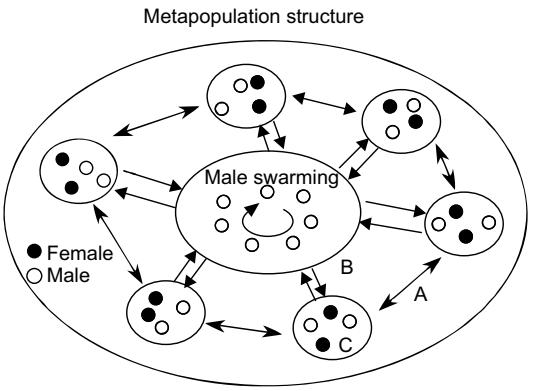
(i) If denaturation of double-stranded DNA does not take place, then primers will not be able to anneal to the template. Amplification will not occur and no extension will take place.

OR

(ii) After cleavage by restriction endonuclease, each DNA strand base little single-stranded portion at the end called sticky ends.

Answer 9.

According to Levins' original formulation, a metapopulation is a 'population of populations'. It is a set of populations located in/on spatially distinct habitats (islands, patches) that exchange individuals with (reasonable) likelihoods of immigration between populations and of extinction of individual populations. They interact with by exchanging individuals. It occurs in the area in which suitable habitat is patchily distributed and separated by stretches of unsuitable habitat.



Section-C

Answer 10.

S. No.	Primary Succession	Secondary Succession
1.	It occurs in an area where no community had existed before.	It occurs in the area where a community had existed before.
2.	Lichens are the first organism to appear.	Grasses, shrubs and weeds are the first organisms to appear.
3.	It may take a long time to reach the climax community.	It takes a very short time compared to primary succession to reach climax community.
4.	It begins on bare rocks, dunes, volcanic islands, lava flows etc.	It begins in an area devastated by fire, drought, floods, deforestation, overgrazing etc.

Answer 11.

Plant introduction: It is the process of introduction of plants from their native place to a new place.

Acclimatization: it is the process by which the plant adjust to the gradual change in its environment like change in temperature, humidity, photoperiod, pH etc. and maintain performance across the range of environmental conditions.

Answer 12.

(i) Plant tissue culture.
(ii) Unorganised mass of parenchymatous cells is known as callus.
(iii) Auxin.
(iv) Cytokinin
(v) Totipotency is the ability of a single cell to divide and produce all of the differentiated cells in an organism.
(vi) Explant.

Answer 13.

(i) Mosses are the most endangered plant among all the categories.
(ii) Population of mosses and ferns may be less due to environmental pollution, urbanisation, agriculture expansion or habitat destruction.
(iii) Angiosperm and algae are the most advanced and primitive groups of plants.
(iv) Fungi are heterotrophs and lack chlorophyll, they can reproduce both sexually and asexually and hence they can sustain themselves as a large population.

OR

(i) These organisms belong to Australia.
(ii) Adaptive radiation refers to the evolutionary divergence of members of a single lineage into a variety of different adaptive forms. The adaptive forms usually differ in their use of resources or habitats. The divergence in these forms happens in a relatively short interval of geological time. In other words, a group of animals tends to evolve in response to selective pressures and adapt to their environments in different ways.
(iii) They exhibit adaptive radiation and evolved into different varieties. ❑❑