Short Answer Questions-II (PYQ)

[3 Marks]

Q.1. List any four important components of poultry farm management.

OR

a. **Name any two fowls other than chicken reared in a poultry farm.**
b. **Enlist four important components of poultry farm management.**

Ans. Four important components of poultry farm management are:

i. Selection of disease-free and suitable breeds
ii. Proper and safe farm conditions
iii. Proper feed and water
iv. Hygiene and health care

OR

a. Ducks and geese.
b. Four important components of poultry farm management are:
    i. Selection of disease-free and suitable breeds
    ii. Proper and safe farm conditions
    iii. Proper feed and water
    iv. Hygiene and health care

Q.2. Enumerate any six essentials of good, effective dairy farm management practices.

Ans. The following efforts need to be put in:

i. The cattle in the dairy farm must be housed and fed properly.
ii. Cleanliness should be maintained in the milking area.
iii. The health of the dairy cattle should be of utmost importance and a veterinary doctor must visit regularly.
iv. Regular inspections of the farm, maintaining records, identification and rectification of problems should be done along with maintaining precautionary measures.
v. Milking should be done in a dirt-free area and all the sanitary conditions should be maintained.
vi. High-yielding and disease-resistant breeds can be selected to maximise benefits.

Q.3. Explain the advantages of animal inbreeding plant programme. Mention when would inbreeding depression occur.

OR

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

Ans. Animal inbreeding has the following advantages:

i. It helps in evolving the pure lines of animals.
ii. It helps in accumulation of superior genes and elimination of less desirable genes.
iii. There is an increase in productivity in the inbred population.

Inbreeding depression stands for the inability of an organism to reproduce. It occurs due to continued inbreeding especially close inbreeding. There is reduction in fertility and productivity of the population that is inbred continuously.

Q.4.

a. Explain how to overcome inbreeding depression in cattle.
b. List three advantages of inbreeding in cattle.
c. Name an improved breed of cattle.

Ans.

a. In order to overcome the cattle from inbreeding depression, selected animals of the breeding population should be mated with unrelated superior animals of the same breed. This helps in restoring the fertility and yield in the cattle.
b.
   i. Pure lines can be obtained.
   ii. Harmful recessive genes are exposed that are eliminated by selection.
   iii. Superior genes can be accumulated by inbreeding by eliminating undesirable genes.
c. Jersey cow.

Q.5. Mention the cause and effect of inbreeding depression in cattle. How can it be overcome? Explain.

Ans. Inbreeding which refers to the mating between closely related individuals with the same breed for 4–6 generations causes inbreeding depression. Continued inbreeding, especially close inbreeding usually reduces the fertility and even productivity of the organism, this is called as inbreeding depression.

It can be overcome by mating the selected animals of breeding population with unrelated superior animals of same breed to restore fertility and yield.

Q.6.

a. **What is inbreeding depression?**
b. **Explain the importance of "selection" during inbreeding in cattle.**

Ans.

a. Continuous inbreeding, especially close inbreeding, usually reduces fertility and even productivity or yield. This phenomenon is called inbreeding depression.
b. Selection during inbreeding helps in accumulation of superior genes and elimination of less desirable genes. It increases homozygosity, pure lines, true breeding and helps to restore fertility. It also helps to increase yield or productivity. The cattle produces more milk per lactation, produces superior progeny and produces disease resistant breeds.

Q.7. Expand MOET. Explain the procedure of this technology in cattle improvement.

Ans. MOET stands for Multiple Ovulation Embryo Transfer Technology.

Procedure:

i. A cow is administered hormones with FSH-like activity to induce follicular maturation and super-ovulation.
ii. The cow produces 6−8 eggs instead of one egg produced normally.
iii. It is now, either mated with an elite bull or artificial insemination is carried out.
iv. When the fertilised eggs attain 8−32 cells stage, they are non-surgically removed and transferred to a surrogate mother.
v. The genetic mother can now be again super-ovulated.

Q.8.

a. **What is the programme called that is involved in improving success rate of production of desired hybrid and herd size of cattle?**
b. **Explain the method used for carrying this programme for cows.**

Ans.

a. Multiple ovulation embryo transfer method/MOET.
b. Procedure :
    i. A cow is administered hormones with FSH-like activity to induce follicular maturation and super-ovulation.
    ii. The cow produces 6−8 eggs instead of one egg produced normally.
    iii. It is now, either mated with an elite bull or artificial insemination is carried out.
    iv. When the fertilised eggs attain 8−32 cells stage, they are non-surgically removed and transferred to a surrogate mother.
    v. The genetic mother can now be again super-ovulated.

Q.9.

a. **Name the Indian scientist whose efforts brought 'green revolution' in India.**
b. **Mention the steps that are essentially carried out in developing a new genetic variety of crop under plant breeding programme.**

Ans.

a. M.S. Swaminathan brought green revolution in India.
b. The steps are:
    i. Collection of variability.
    ii. Evaluation and selection of parents.
    iii. Cross hybridisation among the selected parents.
    iv. Selection and testing of superior recombinants.
    v. Testing, release and commercialisation of new cultivars.

Q.10. Define totipotency of a cell. List the requirements if the objective is to produce somaclones of a tomato plant on commercial scale.

Ans. The capacity of a cell/explant to grow into a whole plant is called totipotency.

Requirements:

i. Explant: Any part of a plant taken out and grown in a test tube.
ii. Nutrient medium: It must have carbon source (sucrose), inorganic salts, growth regulators (auxins, cytokinins, etc.), vitamins and amino acids.
iii. Suitable light and temperature conditions.

Q.11. An organic farmer relies on natural predation for controlling plant pests and diseases. Justify giving reasons why this is considered to be a holistic approach.

Ans. Besides acting as 'conduits' for energy transfer across trophic levels, predators are used in biological control of plant pests. This ability of the predator is based on its regulating the prey population.

The natural predators reduce interspecific competition and does not harm the crop plants. For example, in an area the invasive cactus can be brought under control by cactus-feeding predator (a moth).

Using natural predation, the ecosystem is kept stable without harming any of the trophic levels.

Q.12. Explain the process of artificial hybridisation to get improved crop variety in (i) plants bearing bisexual flowers (ii) female parent producing unisexual flowers.

Ans.

i. In plants bearing bisexual flowers, the anthers are removed from the flower before they dehisce. This is called emasculation. The emasculated flowers are covered with a bag of butter paper to prevent contamination of stigma with unwanted pollen. This process is called bagging. When this stigma attains receptivity, mature pollen grains are dusted on the stigma and the flowers are rebagged to allow the fruits to develop.
ii. If the female parent produces unisexual flowers, there is no need of emasculation. The flower buds are bagged before the flowers open. When the stigma becomes receptive, pollen is dusted on stigma and the flower is rebagged.

Q.13. IARI has released several varieties of crop plants that are biofortified. Give three examples of such crops and their biofortifications.

Ans.

i. Bittergourd enriched in vitamin C.
ii. Carrots enriched in vitamin A.
iii. Spinach enriched in iron and calcium.

Q.14.

a. Write the desirable characters a farmer looks for in his sugarcane crop.
b. How did plant breeding techniques help north Indian farmers to develop cane with desired characters?

Ans.

a. The desirable characters for a sugarcane crop are high yield, thick stem, high sugar content and ability to grow in their areas.
b. *Saccharum barberi* had poor sugar content and yield but *Saccharum officinarum* had thicker stems and higher sugar content. By crossing *Saccharum officinarum* the south Indian variety with *Saccharum barberi* the north Indian low yield variety the farmers developed cane having desired characteristics.

Q.15. Explain the efforts which must be put in to improve health, hygiene and milk yield of cattle in a dairy farm.

Ans. The following efforts need to be put in:

i. The cattle in the dairy farm must be housed and fed properly.
ii. Cleanliness should be maintained in the milking area.
iii. The health of the dairy cattle should be of utmost importance and a veterinary doctor must visit regularly.
iv. Regular inspections of the farm, maintaining records, identification and rectification of problems should be done along with maintaining precautionary measures.

v. Milking should be done in a dirt-free area and all the sanitary conditions should be maintained.
vi. High-yielding and disease-resistant breeds can be selected to maximise benefits.

Q.16. Differentiate between somaclones and somatic hybrids. Give one example of each.

Ans.

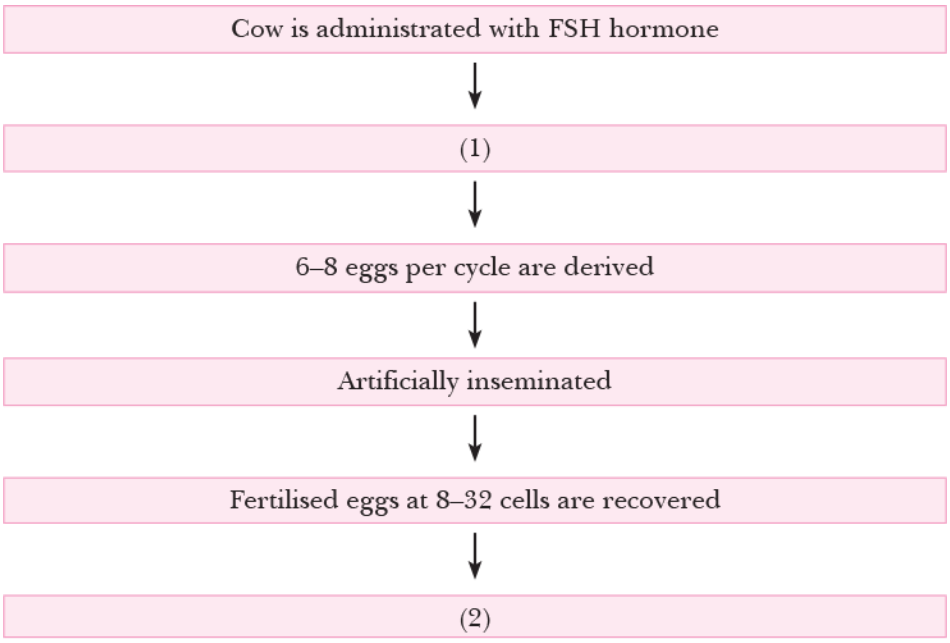
S. No.	Somaclones	Somatic hybrids
(i)	These are genetically identical to the original plant from which they are grown.	These are formed by fusion of somatic cells obtained from different varieties or species of plant.
(ii)	These are produced by tissue culture or micropropagation.	These are produced by somatic hybridisation.
(iii)	**Example:** Tomato, banana, etc.	**Example:**Pomato formed by fusion of tomato and potato.

Q.17. Differentiate between inbreeding and outbreeeding in cattle. State one advantage and one disadvantage for each one of them.

Ans.

Inbreeding	Outbreeding
1. It is breeding between same breeds of animals. 2. **Advantage:** Helps in accumulation of superior genes. 3. **Disadvantage:** Reduces fertility/productivity.	1. It is breeding between different breeds of animals. 2. **Advantage:** Helps overcoming inbreeding depression. 3. **Disadvantage:** There is a possibility of introduction of undesirable characters.

Q.18. Study the flow chart given below:



Q. Identify the events that take place at stages (1) and (2) respectively.

Ans. Events taking place at:
Stage (1) — Follicular maturation;
Stage (2) —Transfer to surrogate mothers

Q. State the importance of the technology explained above.

Ans. Due to this technology, high milk-yielding breeds of cows and high quality meat yielding bulls have been bred successfully to increase herd size in a short time.

Q.19. Why is it necessary to emasculate a bisexual flower in a plant breeding programme? Mention the condition under which emasculation is not necessary.

Ans. Emasculation is necessary to ensure that only the desired pollen grains are used for pollination and the stigma is protected from contamination (from unwanted self pollen). The anthers are removed followed by bagging so the plant now behaves as a female plant. The pollen grains from the anthers of the desired male plant can be dusted on the stigma of flower of the female plant to obtain desired results.

Emasculation is not required if the plant produces unisexual flowers.

Q.20.

a. Write the two limitations of traditional breeding technique that led to promotion of micro propagation.
b. Mention two advantages of micropropagation.
c. Give two examples where it is commercially adopted.

Ans.

a.
   i. Failed to keep pace with demand.
   ii. Failed to provide fast and efficient system of crop improvement.

b.
   i. Large number of plants can be developed in a short duration.
   ii. Production of genetically identical plants or somaclones.
   iii. Healthy plants can be recovered from diseased plants. [*Any two*]

c. Tomato, banana, apple. [*Any two*]

Q.21. Mention the property of plant cells that has helped them to grow into a new plant in *in vitro* conditions. Explain the advantages of micropropagation.

Ans. The property of plant cells that helped them to grow into a new plant is totipotency. The advantages of micropropagation are:

i. It is possible to achieve propagation of a large number of plants in very short durations. Plants like tomato, banana, apple, etc., have been produced on commercial scale.
ii. Healthy plants can be recovered from diseased plants by micropropagation. This is done by removing the meristem, which is disease-free and growing it *in vitro*. This has been done in banana, sugar cane, potato, etc.

Q.22. 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. Crop varieties can be made disease-resistant by conventional breeding methods or by mutation breeding. The germplasm is screened for resistance sources or mutations are introduced, followed by hybridisation of selected parents. The resulting hybrids are evaluated and tested. Finally, disease-resistant varieties are released.

Disease-resistant variety of:

a. Wheat to leaf and stripe rust—*Himgiri*.
b. *Brassica* to white rust—*Pusa swarnim*.

Q.23. Answer the following questions:

Q. What is micropropagation? Why are the plants produced by micropropagation called somaclones?

Ans. Micropropagation is the method of growing a number of plants through tissue culture. Since tissue culture involves only mitotic divisions, the plantlets formed are genetically identical and hence are called somaclones.

Q. Name the technique by which healthy plants can be recovered from the diseased plants.

Ans. Meristem culture.

Q.24. Answer the following questions:

Q. "Fortification of crops is the need of the hour." Give two reasons.

Ans. Fortification of crops is needed for following reasons:

a. To improve the nutritional quality,
b. to improve public health,
c. to prevent malnutrition, (Any two)

Q.25. Select one fresh water and one marine fish from the following:

Prawn; Catla; Mackerel; Lobster

Ans. Fresh water : Catla

Marine fish : Mackerel.

Short Answer Questions-II (OIQ)

[3 Marks]

Q.1. What is mutation? What is its significance in the biological world? Name any two agents that induce mutation.

Ans. The sudden, heritable change in genetic sequence of an individual is called mutation.

Mutation may cause development of new characters or traits which was absent in parental type. The two agents that induce mutation are gamma radiation and ethyl methane sulphonate.

Q.2. What is mutation? List the step how mutation breeding is carried out in agricultural crop.

Ans. The sudden, heritable change in genetic sequence of an individual is called mutation.

Steps of mutation breeding in agricultural crop:

i. Mutation is induced by chemical or physical means, for example, gamma rays.
ii. Selection of the plant for disease resistance.
iii. These plants are multiplied for breeding.
iv. The selected plants are hybridised.
v. Selection of disease resistant plants, followed by their testing and finally release of the variety.

Q.3. Give one example of disease caused each by fungi, bacteria and viruses in crop plant.

Ans. **Fungal disease:** Red rot of sugarcane, brown rust of wheat.
Bacterial disease: Citrus canker, black rot of crucifers.
Viral disease: Turnip mosaic, tobacco mosaic.

Q.4. Mention '*a*' and '*b*' in the following flow chart. Why is its importance (technique shown in following flow chart) increasing?

Habit and nature of bees
↓
Selection of location
↓
Catching and having of swarms
↓
a
↓
b

Ans.

a. Management of beehives.
b. Handling and collection of honey.

Importance of apiculture is increasing because—

i. it produces beeswax, which is used in industries for preparation of cosmetics and polishes.
ii. honey has high nutritive value and is also a key ingredient in many medicines.

Q.5. According to Global Hunger Index, 2014, two billion people suffer from hidden hunger. Apply your knowledge of plant breeding techniques to suggest a programme to improve public health. Specify four objectives of the programme. Also, mention one example of such a produce.

Ans. Biofortification can improve public health. It involves breeding crops with higher levels of vitamins and minerals, or higher protein and healthier fats.
Breeding for improved nutritional quality is improving:

i. Protein content and quality;
ii. Oil content and quality;
iii. Vitamin content; and
iv. Micronutrient and mineral content.

In the year 2000, maize hybrids that had twice the amount of the amino acids, lysine and tryptophan, compared to existing maize hybrids were developed. Another example is the wheat variety, Atlas 66, having a high protein content which has been used as a donor for improving cultivated wheat.