Model Answer Paper

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION
B.Sc. (Hons.) (Agri)

Semester: IV (New)		**Academic year: 20201-22**
Course No.: ELE GPB- 244		**Course Title:- Commercial Plant Breeding**
Credits : 3 (1+2)		
Day & Date:- 23.11.2021	**Time:---**	**Total Marks:-40**
Note:-	**1. Solve ANY FOUR questions from SECTION 'A'**	
	2. Solve any SIX questions from SECTION 'B'	
	3. All questions from SECTION 'C' are compulsory	
	4. Send the PDF of answer sheet to the e- mail of respective course teacher	

SECTION A

Que. 1 (Write the answer in 4-5 sentences only. Each question carries 4 marks)

a) Enlist the factors responsible for loss of genetic purity

The several factors are responsible for loss of genetic purity during seed production are,

1. Developmental Variation
2. Mechanical Mixtures
3. Mutations
4. Natural Crossing
5. Genetic drift
6. Minor Genetic Variation
7. Selective influence of Diseases
8. Techniques of the Breeder
9. Breakdown of male sterility
10. Improper / defective seed certification System

b)Write down types of crops and its classification on the basis of any four points.

1. Food crops:- (wheat, Maize, Rice, Millets and Pulses etc.
2. Cash crops:- Sugarcane, Tobacco, Cotton, Jute and Oilseeds etc.,
3. Plantation crops:- Coffee, Coconut, Tea, Rubber, etc.,
4. Horticultural Crops:- Fruits and Vegetables etc/.

c) Classification of agricultural crops is generally done on the basis of (any four)

1. Binomial classification: Family, botanical name
2. Agronomic classification:- Cereals, Oilseeds, Pulses, sugar crops, Fibre crops, Rubber crops, fodder crops, Medicinal Crops, root crops, stimulant crops (ex. Tea, Coffee, tobacco).
3. Special purpose crops:- Catch crops or emergency crops ex. Sunflower, Cash crops (Cotton), Cover crops (soil cover), Green manure crops, Silage crops (forage)
4. According to life span: -Annual, Biannual, Perrinial
5. Based on photosynthesis (Co2 fixation): C3, C4 and CAM plants
6. Based on root system:, Tap root, adventitious root
7. Based on length of photoperiod:- Short day plants, Long day plants, Day neutral plants
8. Based on sowing season:- Kharif , rabi, summer/zaid,
9. Based on climate:- Tropical, Temperate

10. Based on no. of cotyledons: Monocots and Dicots

d) Define male sterility. Write its type and advantages.

(Marks 1 for definition and 3 for types and advantages)

Ans. Male sterility: A condition in which either pollen is absent or non-functional in flowering plants.

Types

1. Genetic male sterility
2. Cytoplasmic male sterility
3. Cytoplasmic genetic male sterility
4. Chemically induced male sterility
5. Transgenic male sterility
6. Environment sensitive male sterility-TGMS. PGMS

Advantages :

Male sterility is an important out breeding mechanism which prevents autogamy and promotes allogamy.

Male Sterility is useful for production of hybrid seed in large quantity.

e) Enlist the various steps involved in maintenance of nucleus seed of pre released varieties.

Maintenance of nucleus seed of pre -released or newly released varieties:

1. Sampling of a variety to obtain nucleus seed
2. Table examination of samples
3. Location and seeding of nucleus seed:
4. Inspection of nucleus double row plots and removal of off types
5. Harvesting and threshing

f) Enlist various steps involved in hybrid seed production in sunflower crop using male sterility system.

In Sunflower hybrid seed is produced by using cytoplasmic genetic male sterile system. The source of cytoplasm used is *Helianthus peteolaris*.

Hybrid seed Production (AxR):

1. Land requirement: Select the fields in which sunflower was not grown in the previous year.

2. Isolation requirement: The seed fields must be isolated from other sunflower fields and from wild sunflower species by 600 meters for maintenance of A line and 400 meters for hybrid seed production or AxR.

3. Planting ratio: The proportion of female (A-line) and male line (B or R-line) should be 3:1 with two border rows of male parents on the sides of seed production plot.

4. Brief Cultural Practices: Cultural practices similar to commercial crop production should be adopted for raising a good crop.

5. Roughing: Rouging should be done in both male and female parental line to remove the volunteer plants and offtypes from both male and female parental line.

6. Number of Field Inspections : A minimum of four field inspections should be conducted.

7. Supplementary Pollination :

a. Hand pollination:. b. Bee Hives: Bee hives may be kept at 200 feet distance at 3-4 places in the field to increase bee activity.

Harvesting and threshing:

Seed Yield: Depending on the inbred line and the management practices adopted seed yield may be in the range of 4-5 q/ha.

SECTION B

(Write the answer in one sentence only. Each question carries 2 marks)

Q.2 Do as directed (one mark each)

a) Write botanical name of

i) Pearlmillet: ***Pennisetum typhoids***, ii) Onion: - ***Allium cepa***

b) Write full form of

i) SVRC: - **State Varietal Release Committee**, ii) NSC: **National Seed Corporation**

c) Write definition of inbred line: **Nearly homozygous line in cross pollinated crop.**

d) What is **Detasselling**: In Maize removal of the tassel from the female parent before shedding pollen is called as **Detasselling.**

e) **Define anther culture:** Anther culture is a means of obtaining haploids from the pollen grains. Haploid plants may be obtained from pollen grains by placing anthers or isolated pollen grains on a suitable culture medium is called anther or pollen culture.

f) **Define Intellectual property right (IPR)**: The right on an invention to derive economic benefits for his invention (*i.e.* intellectual property) is called as intellectual property rights (IPR).

g) **What is rouging? :** Removal of off types/ volunteer plants from seed production plots.

SECTION C

(Choose the correct option. Each question carry 1 mark)

Q.3Choose the correct answer

1) The variety enters in formal seed production chain after ---

a) Evaluation b) Release

c) Notification d) Testing

2) Foundation seed is the progeny of

a) **Breeder seed** b) Certified seed

c) Nucleus seed d) None of the above

3) Mode of pollination in Tomato is

a) **Self pollination** b) Cross pollination

c) Often cross pollination d) None of the above

4) Average performance of a line in a series of crosses is known as

a) SCA b**) GCA**

c) GCV d) PCV

5) IPR is a general term which covers

a) Patents b) Copyright

c) Trademark **d) All the above**

6) PPV & FR Act was enacted in the year

a) 2001 b) 2005

c) 2010 d) 2015

7) In hybrid seed production of Bajra what is the planting ratio of sterile line (A-line) with the restore line.

a) 4 : 2 b) 6 : 2

c) 8 : 2 d) 10 : 2

8) The hybrid seed (F1) belongs to which category of seed.

a) Breeder seed b) Foundation seed

c) Certified seed d) Nucleus seed

9) Transfer of male sterility source in the new line is done by

a) Poly cross method b**) Back cross method**

c) Single cross method d) None of the above

10) In seed propagating crops which male sterility is not useful?

a) GMS **b) CMS**

c) CGMS d) None of the above

11) Method of maintaining nucleus seed of inbred lines involves

a) Self pollination b) Sib pollination

c) Both of above d) None of the above

12) When two single crosses are crossed the resulting hybrid population is known

a) Single cross b) Three Way cross

c) Double cross d) Poly cross