CBSE-XII-2014 EXAMINATION

BIOLOGY

SET-1

Series OSR

Paper & Solution

Code: 57/1

Time: 3 Hrs.

Max. Marks: 70

General Instructions:

(i) ***All*** *questions are compulsory.*

(ii) This question paper consists of four Sections ***A, B, C*** *and* ***D****. Section* ***A*** *contains* ***8*** *questions of* ***one*** *mark each, Section* ***B*** *is of* ***10*** *questions of* ***two*** *marks each, Section* ***C*** *is of* ***9*** *questions of* ***three*** *marks each and Section* ***D*** *is of* ***3*** *questions of* ***five*** *marks each.*

(iii) There is no overall choice. However, an internal choice has been provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks weightage. A student has to attempt only one of the alternatives in such questions.

(iv) Wherever necessary, the diagrams drawn should be neat and properly labelled.

SECTION A

1. Name the part of the flower which the tassels of the corn-cob represent.

Solution:

Style.

2. Mention any two contrasting traits with respect to seeds in pea plant that were studied by Mendel.

Solution:

Seed shape : Round and Wrinkled

Seed colour : Yellow and Green

3. Why is secondary immune response more intense than the primary immune response in humans ?

Solution:

Our body appears to have memory of first encounter that's why secondary immune response is more intense than primary immune response.

4. Why is it not possible for an alien DNA to become part of a chromosome anywhere along its length and replicate normally ?

Solution:

Because origin of replication is not present in recombinant DNA.

5. State the role of C peptide in human insulin.

Solution:

C peptide maintains the insulin in its inactive or Dormant stage proinsulin.

6. Name the enzymes that are used for the isolation of DNA from bacterial and fungal cells for recombinant DNA technology.

Solution:

Enzyme used to isolate DNA from bacteria: Lysozyme

Enzyme used to isolate DNA from Fungi : Chitinase

7. State Gause's Competitive Exclusion Principle.

Solution:

It states that two closely related species competing for the same resourses can not co exist indefinitely andthe competitively inferior one will be eliminated evantually.

8. Name the type of association that the genus Glomus exhibits with higher plants.
Solution:
Ectomycorrhiza

SECTION B

9. Why are the human testes located outside the abdominal cavity ? Name the pouch in which they are present.
Solution:
Human testes are located outside the abdominal cavity in a pouch called scrotum because scrotum helps in maintaining low temperature of testes that is 2 – 2.5°C lower than internal body temperature which is necessary for spermatogenesis Testes are located in scrotum.

10. In Snapdragon, a cross between true-breeding red flowered (RR) plants and true-breeding white flowered (rr) plants showed a progeny of plants with all pink flowers.
(a) The appearance of pink flowers is not known as blending. Why ?
(b) What is this phenomenon known as ?
Solution:
(a) The appearance of pink flower is not known as blending because different alleles don't mix to each other in pink flower and segregate to each other during gamete formation (Law of Segregation)
(b) This phenomenon is known as incomplete Dominance.

11. With the help of one example, explain the phenomena of co-dominance and multiple allelism in human population.
Solution:
Co-dominance when both the alleles of a gene express themselves completely in heterozygous condition it is known as co-dominance.
AB Blood group individual
Blood group A contain a antigen
Blood group B contain b antigen
While Blood group AB contain a&b both antigen
There are three allele for ABO blood group is present in human population
e.g. ABO blood group in human
Multiple allelism: When more than two allele for a gene is present in a population it is known as multiple Allelism

12. Write the scientific name of the fruit-fly. Why did Morgan prefer to work with fruit-flies for his experiments ? State any three reasons.

OR

Linkage and crossing-over of genes are alternatives of each other. Justify with the help of an example.
Solution:
Fruit fly : Drosophila melenogaster
Morgan use fruit fly as experimental material because of
1. Its short life span
2. It can be easily cultivated / cultured
3. Contrasting feature are easily observed

4. Produce large no. of offspring

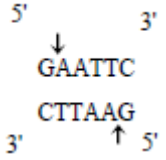
OR

Linkage & crossing over are alternative or opposite phenomenon.
Linkage is transfer of two gene from one generation to another together, while crossing over is separation of two linked gene.

13. List the symptoms of Ascariasis. How does a healthy person acquire this infection ?
Solution:
Symptoms of Ascariasis ⇒
(1) Vit. A deficiency
(2) Fever
(3) Intestinal obstruction
(4) Eiosinophilia
(5) Appendicitis
(6) Internal bleeding
(7) Muscular pain
(8) Anemia
Mode of infection :- A healthy person aquires this infection through water, food fruits, vegetable etc. contaminated with embryonated egg of ascaris.

14. Explain the significant role of the genus Nucleopolyhedrovirus in an ecological sensitive area.
Solution:
Nucleopolyhedrovirus is a type of bacculovirus that attacks insect and other arthropodes and control the population of insect & arthropodet.
These viruses are excellent candidates for species specific narrow spectrum insecticidal application. They have been shown to have no negative impact on higher animals and plant and human. This is desirable when beneficial insect are being conserved to aid in overall IPM or when an ecological sensitive area is being treated.

15. How does a restriction nuclease function ? Explain.
Solution:
Restriction endonuclease is a hydrolytic enzyme. This enzyme is commonly present in bacteria. This enzyme breaks the internal phosphodiester bond present between two specific nucleotide on restriction site. This enzyme breaks the DS DNA molecule internally
These enzymes are highly specific e.g. ECORI enzyme

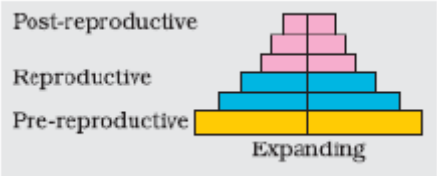


16. How have transgenic animals proved to be beneficial in :
(a) Production of biological products
(b) Chemical safety testing
Solution:

Use of Transgenic animals in
(a) Production of biological product: biological product are used in medicine are generally expensive. These product can be produced from transgenic animals which have the appropriate gene which produce the particular product.
e.g. production of α-1-antitrypsin from animals which is used in emphysema
(b) Transgenic animals are also used to test the chemical safety. Transgenic animals are created by insertion of gene which make them more sensitive to toxic substance than normal animals. They are then exposed to chemical & effect are studied.

17. Describe the mutual relationship between fig tree and wasp and comment on the phenomenon that operates in their relationship.
Solution:
Mutualism is present between wasp and fig tree. female wasp lays its egg inside developing fruit of fig tree. Female wasp use fig fruit as oviposition site and also use its developing seed for nourishing its larva. The wasp pollinate the fig inflorescence while searching for suitable site for egg laying.
Thus fig and wasp both get benefited from this phenomenon.

18. Construct an age pyramid which reflects an expanding growth status of human population.
Solution:



19. Make a list of any three outbreeding devices that flowering plants have developed and explain how they help to encourage cross-pollination.

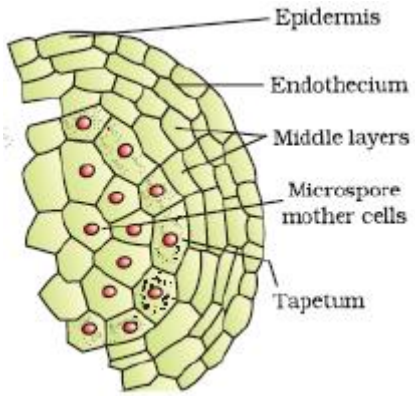
OR

Why are angiosperm anthers called dithecous ? Describe the structure of its microsporangium.
Solution:
Out breeding devices present in flowering plant
1. Unisexual flower: unisexual flower in monoecious plant prevent the autogamy but does not prevent geitanogamy but in dioecious plant only Allogamy occurs that is when ever unisexual flower are present cross pollination occur.
2. Dichogamy: when pollen release and stigma is not synchronized then self pollination can not occurs.
It can be of two type
1. Protoandry : pollen release before stigma become receptive .
2 Protogyny : stigma become receptive before pollen release .
3. Self Incompatibility : This is genetic mechanism and prevent self pollen to fertilize the ovule by inhibiting pollen tube growth or pollen germination.
4. Presence of anther and stigma placed at different position so autogamy can not occur

OR

Angiosperm anther is known as dithecous because each anther has two anther lobe
Structure of microsporangium: In a transverse section, a typical microsporangium appears near

circular in outline. It is generally surrounded by four wall layers the epidermis, endothecium, middle layers and the tapetum. The outer three wall layers perform the function of
protection and help in dehiscence of anther to release the pollen. The innermost wall layer is the tapetum. It nourishes the developing po llen grains. Cells of the tapetum possess dense cytoplasm and generally have more than one nucleus. Can you think of how tapetal cells could become bi-nucleate? When the anther is young, a group of compactly arranged homogenous cells called the sporogenous tissue occupies the centre of tissue occupies the centre of each microsporangium.



20. If implementation of better techniques and new strategies are required to provide more efficient care and assistance to people, then why is there a statutory ban on amniocentesis ? Write the use of this technique and give reason to justify the ban.

Solution:

Statutory ban on amniocentesis for sex determination to legally check increasing female foeticides, massive child immunization etc.

Technique of Amniocentesis → Amniocentesis a foetal sex determination test based on chromosomal pattern in amniotic fluid surrounding the developing embryo.

21. Why is pedigree analysis done in the study of human genetics ? State the conclusions that can be drawn from it.

Solution:

Pedigree analysis is done in the study of human genetics because control crosses can not be possible in human being and age of human is more.

Pedigree analysis can be use to trace the inheritance of a specific trait abnormality or disease. Study of family history about inheritance of a particular trait in a several generation of a family is called pedigree analysis.

22. Identify ‘a’, ‘b’, ‘c’, ‘d’, ‘e’ and ‘f ’ in the table given below :

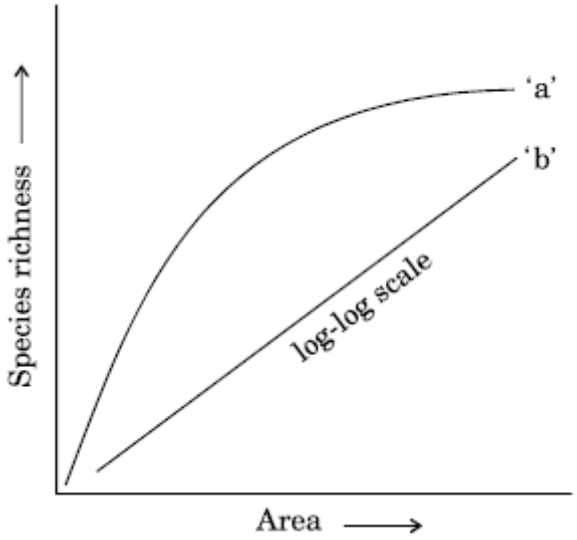
No,	Syndrome	Cause	Chracteristics of Affected individuals	Sex Male/Female/Both
1.	Down’s	Trisomy Of 21	‘a’ (i)	‘b’
2.	‘c’	XXY	Overall masculine development	‘d’
3.	Turner’s	45 mith XO	‘e’ (i) (II)	‘f ’

Solution:

a. (i) Short statured with small round head
(ii) Furrowed tongue
(iii) Partially open mouth
(iv) Broad palm with palm crease
(v) physical, psychometor and mental development retarded
b. Both
c. Klinefelter syndrome
d. male
e. (i) sterile female with rudimentry ovaries
(ii) lack of secondary sexual character
f. Female

23. Community Service department of your school plans a visit to a slum area near the school with an objective to educate the slum dwellers with respect to health and hygiene.
(a) Why is there a need to organise such visits ?
(b) Write the steps you will highlight, as a member of this department, in your interaction with them to enable them to lead a healthy life.
Solution:
(a) Need to Organize Community Service Department to visit a slum area ⇒
To aware people of slum area about health & hygiene because heath may affected by
(i) Infection
(ii) Life style including food and water we take, rest & exercise we give to our body and habitate we have or lack etc.
(b) Our interactual points with people of slums
(i) When people are healthy they are more efficient at work
(ii) Health also increases productivity, economy, longevity and reduces infants & maternal mortality
(iii) We have to also aware tham about disease & their effect vaccination proper disposal of waste, control of vector & maintenance of hygieniners of environment.

24. The following graph shows the species – area relationship. Answer the following questions as directed.



(a) Name the naturalist who studied the kind of relationship shown in the graph. Write the observations made by him.
(b) Write the situations as discovered by the ecologists when the value of 'Z' (slope of the line) lies between

(i) 0.1 and 0.2
(ii) 0.6 and 1.2
What does 'Z' stand for ?
(c) When would the slope of the line 'b' become steeper ?

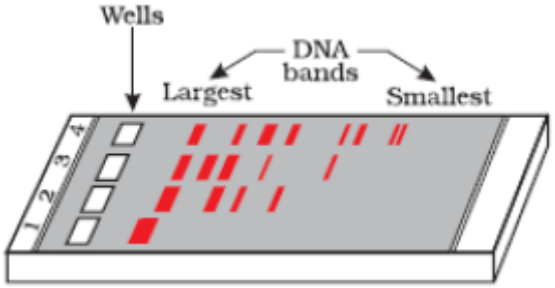
Solution:

(A) Species area relationship was studied by Alexander Von Humboldt. He observed that within a region, species richness increased with increasing explored area but only upto a limit.
(B) (i) z = 0.1 to 0.2: for small area regardless of taxonomic group
(ii) z = 0.6 to 1.2 : for large area for example entire continent
(C) The slope of the like b become steeper when species area relationship is analyzed in a very large area like the entire continents.

25. Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.

Solution:

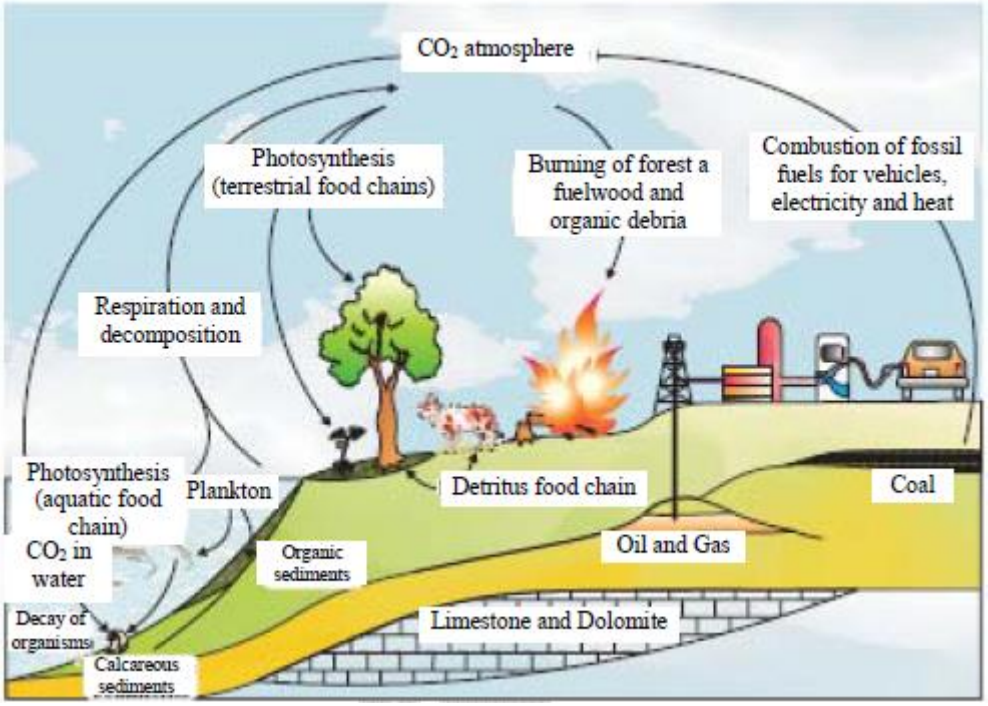
Agarose gel electrophoresis is used to help the separating restricted DNA fragment
Agarose gel electrophoresis:
The cutting of DNA by restriction endonucleases results in the fragmentes of DNA. These fragments can be separated by a gel electrophoresis. Since DNA fragments are negatively charged molecules they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix. The DNA fragments separate (resolve) according to their size through sieving effect provided by the agarose gel. Hence, the smaller the fragment size, the farther it moves. The separated DNA fragments can be visualized only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation (you cannot see pure DNA fragments in the visible light and without staining).



26. State the function of a reservoir in a nutrient cycle. Explain the simplified model of carbon cycle in nature.

Solution:

The function of reservoir is to meet with the deficit which occurs due to imbalance in the rate of influx and efflux.



27. Since the origin of life on Earth, there were five episodes of mass extinction of species.
(i) How is the 'Sixth Extinction', presently in progress, different from the previous episodes ?
(ii) Who is mainly responsible for the 'Sixth Extinction' ?
(iii) List any four points that can help to overcome this disaster.

Solution:

(a) Sixth extinction rates are estimated to be 100 to 1000 times faster than in pre human times.
(b) Human activities in ecosystem is mainly responsible for sixth extinction.
Main reason for this extinction is
1. Habitat loss and fragmentation.
2. Over exploitation
3. Alien species introduction
4. Co extinction
(c) Sixth extinction can be slow down or prevented by
1. Afforestation
2. By preventing habitat loss
3. By use of Diverse species
4. By insitu conservation & ex-situ conservation

SECTION D

28. (a) Where does fertilization occur in humans ? Explain the events that occur during this process.
(b) A couple where both husband and wife are producing functional gametes, but the wife is still unable to conceive, is seeking medical aid. Describe any one method that you can suggest to this couple to become happy parents.

OR

(a) Explain the different ways apomictic seeds can develop. Give an example of each.
(b) Mention one advantage of apomictic seeds to farmers.

(c) Draw a labelled mature stage of a dicotyledonous embryo.

Solution:

(a) In human fertilization occurs in junction of ampulla & isthmus of fallopian tube -

Mechanism of fertilization ⇒

During fertilization sperm comes in contact with zona pellucida of ovum & induces changes in membrane than block the entry of additional sperms to prevent polyspermy.

The secretion of acrosome helps the sperm enter into the cytoplasm of ovum through zona pellucida & the plasma membrane –This induces completion of meiotic division of the secondary oocyte. Which as a result produces one smaller second polar body & a large haploid ovum/ootid. Soon haploid nucleus of sperm fused with that of ovum to form a diploid zygote.

(b) Couple able to produce functional gamete but unable to conceive can assist to have children through one of following techniques commonly called as – Assisted Reproductive Technologies (ART)

(1) In vitroferlilization followed by embryo transfer.

(2) Zygote intra fallopian transfer (ZIFT)

(3) Gamete Intra fallopian transfer (GIFT)

OR

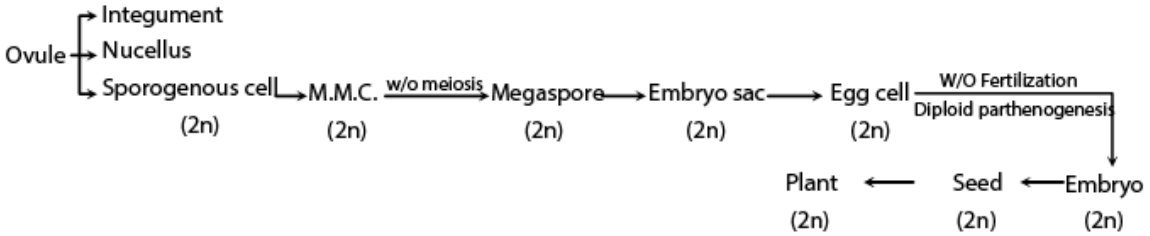
Types of Apomixsis

- **Diplospory ⇒** Ex. Parthenium, Taraxacum.

In this method **archesporium** differentiates to form a **megaspore mother cell** but this **megaspore mother cell directly gives rise to an embryo sac without meiosis.**

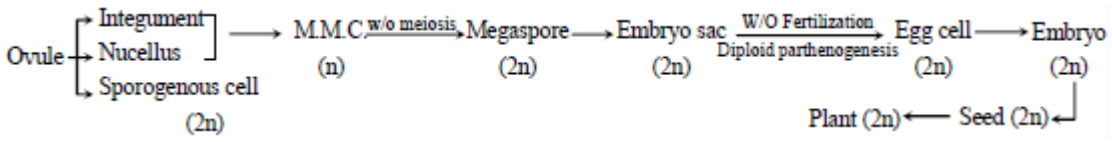
This embryo sac is diploid and a diploid embryo is formed without fertilization from **diploid egg** of this embryo sac

Diplospory is also known as **diploid parthenogenesis.**



Apospory ⇒ Ex. *Heiracium, Ranunculus, Rubus.*

It is discovered by **Rosenberg in Heiarcium** plant. In this method **embryo sac or female gametophyte is directly formed from any diploid cell of the ovule** (nucellus/integument) **except megaspore mother cell** without meiosis is known as **apospory.** In this **gametophyte** always remains **diploid.**

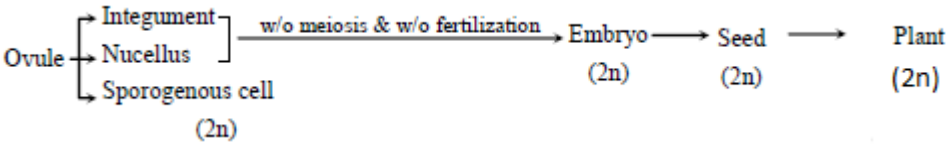


Adventive Embryony ⇒

In this method, an embryo is formed from any **diploid cells (Nucellus or integuments)** of the **sporophyte.** This diploid cell behave like a **zygote and develop** (No embryo sac formation) Adventive embryo.

Ex. from **Nucellus – Citrus, Mangifera, Opuntia, Mamillaria**

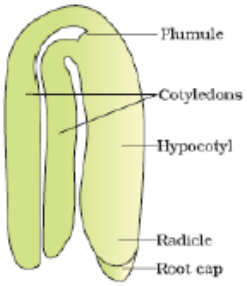
from **Integuments – Spiranthus australis.**



Parthenogenesis : In this process haploid egg cell of female gametophyte is responsible to form a haploid embryo without fertilization.
Apogamy : In this process any haploid cell of female gametophyte except egg cell is responsible to form a haploid embryo without fertilization.
Parthenogenesis and Apogamy both are not included in agamospermy.

Advantage of apomixsis for farmers :

As apomictic seed formation does not involves meiosis and fertilization, they are genetically identical to their parents. If the hybrid seeds become apomictic they will maintain their traits generation after generation as does not involves meiosis so lack of saggregation of characters & not involves fertilization so no recombination and trait will be maintained for several generations, so the farmers does not requires to present the hybrid seeds for every two to three years



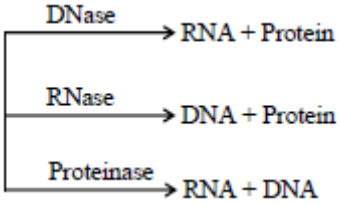
29. (a) Describe the various steps of Griffith's experiment that led to the conclusion of the 'Transforming Principle'.
(b) How did the chemical nature of the 'Transforming Principle' get established ?

OR

Describe how the lac operon operates, both in the presence and absence of an inducer in E.coli.

Solution:

Describe how the lac operon operates, both in the presence and absence of an inducer in *E.coli.*
Griffith transformation experiment → Griffith preformed his experiment on *Streptococcus pneumoneae* bacteria which cause pneumonia is mice.
He used two strain of bacteria
Rough strain: Non capsulate Avirulant Rough colonies on culture media
Smooth strain: Capsulated virulent form smooth colonies on media experiment :- Mice + Smooth strain bacteria → Dead mice
Mice + Rough strain bacteria → Living mice
Mice + Heat killeds bacteria + Rough bacteria → Dead Bacteria on the basis of third experiment he proposed that R bacteria absorb some heat stable material from dead S bacteria and transformed in S bacteria which killed the mice
(b) Nature of transforming principle was established by avery mcleod & Mc carthy experiment



Purified Biochemical from heat killed s-bacteria (DNA + RNA + protein)
They discovered that RNase and protinase treatement does not affect the transformation but DNase treatment inhibit the transformation. It indicate that DNA is transforming principle.

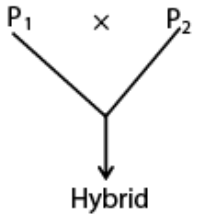
30. With advancements in genetics, molecular biology and tissue culture, new traits have been incorporated into crop plants. Explain the main steps in breeding a new genetic variety of a crop.

OR

(a) State the objective of animal breeding.
(b) List the importance and limitations of inbreeding. How can the limitations be overcome ?
(c) Give an example of a new breed each of cattle and poultry.

Solution:

Different steps involved in breeding a new crop variety.
(1) Collection of variability : Genetic variability is essential for breeding program. If genetic variability is not present than new variety can not be develops thus it is pre requisite condition for breeding
(2) Evaluation and selection of parent : Different germplasm is evaluated for desired trait and plant having the desired character are selected as parent.
(3) Cross hybridization among the selected plant : Hybridization is performed to combine the character of two different parent



(4) Selection and testing of superior recombinants : On the basis of presence of desired character in hybrid, superior recombinant are selected.
(5) Testing, release and commercialization of new cultivars : These new recombinant are evaluated in different agro climatic condition for several years along with best available local check variety. These lines are evaluated for their yield and other agronomic traits. If these line are superior than local check then they are released for commercial cultivation by CVRC

OR

(a) Animal Breeding aims at increasing the yield of animal & improving the desirable qualities of product.
(b) Importance of Inbreeding
(1) Superior male & superior female of same breed are identified for mating.
(2) Inbreeding increase homozygosity thus it provide pure line of animal
(3) It exposes harmful recessive gene that are eliminated by selection
(4) Also accumulates superior genes & elimination of less desirable gene
(5) Increases the productivity of inbreed population

Limitation of Inbreeding :-
(1) Continued inbreeding specially closed inbreeding usually reduces fertility & productivity. This is called as inbreeding depression.
(c) New breed of cattle → Hissardale
New breed of poultry → Leghorn.