**DEPARTMENT OF BOTANY**

**NAMBOL L. SANOI COLLEGE, NAMBOL**

**QUESTION BANK**

**6TH Semester B0T: SE H-609 (HONOURS)**

**PREVIOUS 4 YEARS (2017-2020)**

**PAPER-IX/BOT:SEH-609: CELL BIOLOGY, GENETICS, PLANT BREEDING, BIOTECHNOLOGY AND COMPUTER APPLICATIONS**

## UNIT-1: CELL BIOLOGY

### VERY SHORT ANSWER TYPE

**(1 MARK QUESTIONS)**

**a) What are peroxins? (2017)**

**b) What are nuclear speckles? (2017)**

**c) Give one function of cohesion. (2018)**

**d) Distinguish between plasma membrane of Archaebacteria and that of bacteria. (2018)**

**e) State one function of glyoxysome. (2019)**

**f) State the function of Shelterin. (2019)**

**g) What are satellite DNA? (2020)**

**h) Why are nuclei often round in shape? (2020)**

## SHORT ANSWER TYPE

## (3 MARKS QUESTIONS)

a) Describe the role of $F_0$ of ATP synthase. (2017)

b) Give three functions of lysosomes. (2017)

c) Give a note on gene organization in mitochondria. (2018)

d) Give three functions of smooth endoplasmic reticulum. (2018)

e) Write a note on nuclear pore complex. (2019)

f) Differentiate between prokaryotic and eukaryotic cells with respect to protein synthesis. (2019)

g) Differentiate SER from RER by giving three points. (2020)

h) Discuss the roles of channels and pumps in conferring selectively permeable property on plasma membrane. (2020)

## ESSAY TYPE (12 MARKS QUESTIONS)

1. Explain action potential. Describe the process of nerve impulse transmission to elucidate the role of voltage gated $Na^+$, $K^+$ and $Ca^{2+}$ channels in signaling. (2017)

2. Distinguish between uniport and symport with two points. Describe the process of uniport and symport giving a specific example each. (2018)

3. With a labelled diagram, describe the structure and function of microtubules. (2019)

4. Give an account of the structure and functions of mitochondria with suitable diagrams. (2020)

# UNIT-2: GENETICS

## VERY SHORT ANSWER TYPE

## (1 MARK QUESTIONS)

a) A heterozygous pea plant that is tall with yellow seeds, TtYy, is allowed to self-fertilize. What proportion of the offspring will be tall with yellow seeds? (2017)

b) In a case of quantitative inheritance, how many additive genes are involved if the number of phenotype classes is seven? (2017)

c) What is a monohybrid? (2018)

d) What are Quantitative Trait Loci (QTL)? (2018)

e) What is epistasis? (2019)

(f) Differentiate between a qualitative character and a quantitative character with one point. (2019)

g) Which blood type would not be possible for children of a type AB mother and a type a father? (2020)

(d) Define a supplementary gene. (2020)

## SHORT ANSWER TYPE

## (3 MARKS QUESTIONS)

a) An allele 'A', which is dominant over 'a' allele at morphological level may be codominant with 'a' allele at another phenotypic level. Explain the statement with an example. (2017)

b) Give three features of Quantitative inheritance. (2017)

**c) Law of segregation predicts 3:1 phenotypic ratio in F2. In order to obtain this ratio, certain conditions must be realized, without which phenotypic ratio of a monohybrid cross won't be 3:1. State any three of those conditions. (2018)**

**(d) A homozygous eosin-eyed female is crossed with a white-eyed male. The $F_1$ females are crossed with red-eyed males. What would be the phenotypes of female and male progeny of this cross? (2018)**

**e) Explain why the F2 phenotypic ratio of a cross involving two quantitative genes is 1:4:6:4:1. (2019)**

**f) Do you think that modified dihybrid ratios obtained in case two genes interact to produce a phenotype is a phenomenon disobeying Mendelism ? Explain your answer. (2019)**

**g) What is the difference between outcross and test cross? Mention any two significance of a test cross. (2020)**

**h) Differentiate qualitative traits from quantitative traits. (2020)**



## ESSAY TYPE (12MARKS QUESTIONS)

**1. a) Write an essay on the different types of self-incompatibility in plants. Give the molecular mechanism of sporophytic system of self-incompatibility known till date. (2017)**

**2. b) A tall plant with purple stem is crossed to a dwarf plant with purple stem. Phenotypes of their offspring along with number are presented in the following table: (2018)**

| ***Sl.No.*** | ***Phenotype*** | ***Number*** |
|---|---|---|
| **1.** | **Tall purple** | **474** |

| | | |
|---|---|---|
| **2.** | **Tall green** | **155** |
| **3.** | **Dwarf purple** | **157** |
| **4.** | **Dwarf green** | **54** |

**(a) Assigning gene symbols, work out the genotypes of the two parents.**

**(b) Explain the inheritance of these two traits (height and stem colour).**

***Or***

**In tomatoes, one gene determines whether the plant has purple or green stems, and a separate, independent gene determines whether the leaves are 'cut' or 'potato'. Two matings of tomato-plant phenotypes give the following results:**

| ***Mating*** | ***Parental Phenotypes*** | ***Phenotype and Number of Progenies*** | | | |
|---|---|---|---|---|---|
| | | ***Purple cut*** | ***Purple potato*** | ***Green Cut*** | ***Green potato*** |
| **1.** | **Purple-cut X green cut** | **323** | **102** | **309** | **306** |
| **2.** | **Purple cut X Purple potato** | **220** | **206** | **65** | **72** |

**(a) Which alleles are dominant? Explain your answer.**

**(b) Work out the most probable genotypes for the parents in each cross.**

3. Analyze Mendel's law of Independent Assortment critically and express in your own words, by citing an example. How 9:3:3:1 phenotypic ratio indicates Independent Assortment of genes and how Test Cross ratio of 1:1:1:1 is regarded as confirmatory test of Independent Assortment? (2019)

## UNIT-3: PLANT BREEDING

### VERY SHORT ANSWER TYPE

### (1 MARK QUESTIONS)

a) Mention one means of generating, genetic variation in self-pollinated crops. (2017)

b) Why is acclimatization important after plant introduction? (2017)

c) Define pseudogamy. (2018)

d) What is directed mutagenesis? (2018)

e) Differentiate between autopolyploid and allopolyploid. (2019)

(f) Write the full form of 'NBPGR'. (2019)

g) What is distant hybridization? (2020)

h) Mention one means of generating genetic variation in self-pollinated crops. (2020)

### SHORT ANSWER TYPE

### (3 MARKS QUESTIONS)

a) Discuss the relevance of mode of reproduction in relation to the stability of varieties after release. (2017)

b) Why is it difficult to produce distant hybrids? (2017)

c) How does the dominance hypothesis explain the phenomenon of heterosis? (2018)

d) State three drawbacks/limitations of allopolyploidy. (2018)

e) Suppose you are given a cross-pollinated crop to increase its genetic variability and to fix that the generated variabillity, how will you do? (2019)

f) Why is pure line method not suitable for cross-pollinated crops? (2019)

g) Write the significance of apromixis in plant breeding. (2020)

h) Write three disadvantages of plant introduction. (2020)

## ESSAY TYPE (12 MARKS QUESTIONS)

1. a) Drawing a schematic representation of pureline selection, explain all the steps in the representation sequentially. (2017)

   b) What is replicated yield trial? Write its significance. (2017)

2. Write the procedure, merits and demerits of Mass Selection Method in breeding self-pollinated crops. (2018)

3. Describe the reproductive barriers to production of intergeneric hybrids. (2019)

4. Define heterosis. What are the different types of heterosis? Explain the physiological basis of heterosis. Why is hybrid vigoour lost after a few generations?

## UNIT-4: BIOTECHNOLOGY

### VERY SHORT ANSWER TYPE

### (1 MARK QUESTIONS)

a) Give one means of tackling gene silencing in transgenic plants. (2017)

**b) What is an antisense gene? (2017)**

**c) State the basic difference between the culture medium for regeneration of shoot and that of regeneration of root. (2018)**

**d) What is somaclonal variation? (2018)**

**e) What is the role of RNA in DNA replication? (2017)**

**f) Define vitrification. (2019)**

**g) What do you mean by molecular farming? (2019)h**

**h) What is gene gun or biolistic? (2020)**

**i) Why are enzymes used in protoplast isolation? (2020)**

## SHORT ANSWER TYPE

## (3 MARKS QUESTIONS)

**a) State the stages of micropropagation. (2017)**

**b) How can hyper hydration during shoot multiplication stage of *in vitro* culture be prevented? (2017)**

**c) What is in *planta transformation*? State a few advantages of in *planta* transformation. (2018)**

**d) Mention some future prospects of crop biotechnology. (2018)**

**e) How desirable somaclonal variation is selected in tissue culture programmes with a view to improving a crop plant? (2019)**

**f) How a marker gene is removed from a transgenic plant after importance of their presence is over? (2019)**

**g) Explain terminator gene technology. (2020)**

**h) How will you construct a cDNA library? (2020)**

## ESSAY TYPE (12 MARKS QUESTIONS)

1. Explain chemical method of gene transfer. Write the principles, advantages and disadvantages of calcium phosphate mediated gene transfer. (2017)

2. With a flowchart, describe the process of protoplast isolation. What are isolated protoplasts used for? (2018)

3. Describe, in brief, the three different types of genomics. (2018)

4. Giving specific examples, write an essay on the achievements in crop biotechnology. (2019)

5. Describe the technique of embryo culture and explain its usages in plant breeding programmes. (2020)

6. a) What is a cloning vector ? Give examples. Write in brief about the characteristics of cloning vector. (2020)

   b) Write the procedure of *Agrobacterium*-mediated gene transfer. (2020)



## UNIT-5: COMPUTER APPLICATIONS

### VERY SHORT ANSWER TYPE

### (1 MARK QUESTIONS)

a) Why is a device driver important in the operation of a computer? (2017)

b) State a difference between formula and function in Microsoft Excel. (2017)

c) Give the full form of VPN. (2018)

d) Differentiate between LAN and WAN. (2018)

e) Give one difference between IP address and URL. (2019)

f) What do you mean by the expression, in silico? (2019)

g) Today's computer giant IBM was earlier known by different name which was changed in 1924. What was the name? (2020)

h) What is a spreadsheet? (2020)

## SHORT ANSWER TYPE

## (3 MARKS QUESTIONS)

a) State the steps of inserting a 'Screen Recording' in MS PowerPoint. (2017)

b) Write a note on the application of data mining in biological sciences. (2017)

c) Highlight the importance features of USB pen Drives. (2018)

d) Write a note on relational database. (2019)

e) In Microsoft Excel, write the steps to freeze "Header Rows'. (2019)

f) Compare digital and analog computers. (2020)

g) What are the different types of operating system? Explain the features of any one GUI operating system. (2020)

## ESSAY TYPE (12 MARKS QUESTIONS)

a) What is a PORT in computer? How does it differ from BUS in computer architecture? Give a brief account on the characteristics and applications of various computer ports.

b) Suppose you like to assemble a Desktop Personal Computer. Your father asks you to make a list of items you need to purchase for this. You are also asked to include a brief description of each item with an explaination as to why the item is essential.

Reproduce your list with brief descriptions here.

**c) What is BLAST? How many types of BLAST are there? How does it differ from FASTA? Write the important applications of BLAST**