End-Semester Examination

Date: 6th May 2023

Total Marks: 60
Duration: 3 hrs

SECTION - A

(Answer any 5 questions; 8 marks each)

1. How a promoter controls stress inducible gene expression in plants? Describe with a suitable example. What is the procedure to clone tissue-specific promoters?

2. Why recombinant protein expression through chloroplast transformation is beneficial over nuclear transformation? What are the significances of inverted repeat regions of chloroplast genome? How chloroplast transformed plants are selected?

3. How expression of Cry toxin proteins, plant digestive enzyme inhibitors, and blocking of trehalose biosynthesis and neurotransmission protect the transgenic plants from insect pest infestation, while the products are safe for human consumption?

4. What are the basic differences between gene-trap, promoter-trap and enhancer trap vectors? How are these vectors fish out the respective DNA elements?

5. Describe reverse genetics methods to understand the gene functions, with suitable examples.

6. Give an example of each of these bioenergy production technologies through biotechnology:
   (a) Combustion of lignocellulose (b) conversion of oil (triacylglycerols) to biodiesel

7. Explain the basis of fungal resistance in transgenic plants through targeting (a) fungal cell wall, (b) plant-fungal signalling, (c) pathogenesis related proteins.

8. How programmed cell death is involved in plant defence response to pathogen infection and senescence process?

PLANT Biotechnology (BT- 607)

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SECTION - B (20 questions; 1 mark each)

Name: **Roll No:**

1. Host crop having reduced chance of contaminating food or feed chain with recombinant protein is
   (A) tobacco (B) alfalafa (C) maize (D) tomato

2. Increased stability of recombinant protein is expected in
   (A) tubers (B) seeds (C) fruits (D) leaves

3. ZMapp is a plant expressed recombinant vaccine, manufactured for treatment of
   (A) Middle east respiratory syndrome (B) HIV (C) Ebola (D) Non-Hodgkins Lymphoma

4. Recombinant protein expression through chloroplast genome allows
   (A) improper glycosylation (B) high yield of recombinant protein
   (C) risk of gene silencing (D) transgene polluting other plant species

5. A gene of interest can be integrated to chloroplast genome by
   (A) Agrobacterium-mediated transfer (B) directly by particle bombardment
   (C) homologous recombination (D) digestion followed by ligation

6. Transgene escape from a transplastomic plant is prevented due to
   (A) pollen chloroplasts disintegrate (B) due to fragmentation of ovary
   (C) egg cells chloroplasts rendered sterile (D) pollens nuclei become non-functional

7. Following statement about chloroplast genes is incorrect
   (A) arranged as operons (B) express monocistronic mRNAs
   (C) absence of methylation in genes (D) driven by eukaryotic promoters

8. Foreign gene expression in transformed chloroplast is usually very high because its genome is
   (A) polyploid and homoplasmic (B) transcribed as polycistonic mRNAs
   (C) autonomously replicated (D) protected from gene silencing

9. Insecticidal genes from bacteria and fungus can be best expressed in plants with inclusion of
   (A) additional polyA sites (B) cryptic introns
   (C) additional promoters (D) GC rich codons

10. Which one of the following is a non-plant source constitutive promoter
    (A) Ubiquitin (B) CaMV19S (C) CaMV35S (D) actin

11. The timing of gene expression can be controlled by
    (A) inducible promoter (B) cryptic promoter (C) temporal promoter (D) constitutive promoter

12. A bidirectional promoter has the following DNA element on either side of core promoter
    (A) distal cis element (B) proximal cis element (C) TATA box (D) enhancer element

13. Which of the following is correct regarding the rate-limiting enzyme in ethylene biosynthesis is
    (A) Polygalacturonases (B) myoinositol tetracaine phosphate
    (C) α- aminolevulinic acid synthase. (D) aminocylopropane carboxylic acid sythase

14. A characteristic feature of the chloroplast genome is the presence of
(A) two simple tandem arrays (B) two repeat / repeat interspersions
(C) two identical inverted repeats (D) two compound tandem arrays

15. Plants are preferred over bacterial and mammalian systems for expression of therapeutic recombinant proteins as plants cells facilitate in
(A) low cost of production (B) glycosylation (C) scalability (d) all of above

16. Which of the following compounds in the fungal cell wall can be targeted for generating fungal resistance?
(A) chitin (B) cellulose (C) peptidoglycan (D) phospholipids

17. The following plant hormone is involved in host plant cell signalling response to plant pathogens
(A) abscisic acid (B) jasmonic acid (C) auxin (d) gibberillin

18. Plants are preferred over bacterial and mammalian systems for expression of therapeutic recombinant proteins as plants cells facilitate in
(A) low cost of production (B) glycosylation (C) scalability (d) all of above

19. Biodiesel made from plant storage lipids is chemically known as
(A) triacylglycerols (B) fattyacid methyl easters (C) fattyacid alcohol (d) triglyceride easters

20. Which of the following is used in creating plant mutants for varietal improvement
(A) T-DNA (B) EMS (C) transposon (d) all of above