

**AGRICULTURAL & FOOD ENGINEERING DEPARTMENT  
INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR**

Date of Examination: FN/AN  
Autumn Semester 2011

Full Marks: 30

Time: 2 h

Course: M. Tech. in Applied Botany,

Subject No. AG60032

Subject Name: Crop Breeding & Biotechnological  
Applications

No. of Students: 18

Instructions: Answer **all** the questions.

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1. Explain the working principle of the followings:
  - a) Microprojectile bombardment
  - b) Silicon carbide mediated DNA delivery
  - c) Bio-bead
  - d) GUS reaction
  - e) Negative selection marker

(5X1 =5)
  
2.
  - a) Why reporter and selectable marker genes are required to be present in the construct?
  - b) List 5 reporter genes with their sources and assay systems.
  - c) Why *man A* is considered as a positive selection marker?

(1+2+2 =5)
  
3. Illustrate the design and operational features of Particle Bombardment Gun  

(5)
  
4.
  - a) Diagrammatically represent how triploids can be produced by somatic cell fusion for limited gene transfer from an alien plant to a crop plant.
  - b) How somatic cell hybridization differs from sexual hybridization?
  - c) How breeding on the single chromosome level is achieved by reverse breeding? Substantiate your answer with proper schematic diagram.
  - d) Mention the different functions of the T-DNA region of an octopine Ti-plasmid with suitable diagram.
  - e) Define binary vector with proper diagram.
  - f) Mention the disadvantages of pBIN19 vector over pGreen vector with suitable illustrations.

(3+1+4+2+2.5+2.5 = 15)