

M.Sc. (Ag.) Examination, 2016
Semester-III
Subject: Genetics and Plant Breeding
Course No.: GPB-509
(Biotechnology for Crop Improvement)

Time: Three Hours

Full Marks: 50

Questions are of value as indicated in the margin

Answer any five questions

1. a) What is embryo culture? Describe the different types of embryo culture. Briefly enumerate various applications of embryo culture.
b) What is 'embryo-nurse endosperm' technique? (1.5+2.5+4)+2=10
 2. a) What do you understand by protoplast culture? Mention the various factors upon which isolation of protoplast is dependent.
b) What are the different methods employed for protoplast fusion? Explain one of the methods which is most widely used for fusion.
c) Describe in brief about the potential of somatic hybridization. (1+2)+(2+2)+3=10
 3. a) Give a detailed description of vectors used in gene cloning experiments. Why are linkers and adopters used in such experiments?
b) Describe 'cosmid' as cloning vectors.
c) Why do the laboratory used plasmids have their 'tra' and 'mob' genes deleted?
d) What is *in vitro* packaging? (3.0+1.5)+2+1.5+2=10
 4. a) What is PCR? Describe various steps involved in PCR technique. Describe in detail how amplification is achieved in PCR.
b) Write down the differences between vector based gene cloning and PCR based gene cloning (1+2+4.5)+2.5=10
 5. a) What do you mean by cDNA library and genomic library? Mention the procedure of construction of genomic library.
b) What do you know about subtracted cDNA library (subtracted cloning)? Write down the properties of cDNA and cDNA libraries. (1.5+3.5)+(3+2)=10
 6. a) Outline the different methods of gene transfer techniques used in crop plants.
b) Mention the essential features of 'Ti' plasmid with a suitable diagram. Explain briefly the method of T-DNA transfer and integration into the genome of plant. 2+(3.5+4.5)=10
 7. Give a detailed classification of markers used in plant biological experiments. Mention some desirable properties of molecular markers. What are the essential requirements for MAS in a plant breeding programme. 3+3+4=10
 8. Write short notes on the following (**any five**) : 2×5=10
 - i) RAPD
 - ii) SSR
 - iii) Meristem culture
 - iv) Colony hybridization
 - v) Cloning vector and expression vectors
 - vi) Subculturing
 - vii) Selectable marker genes
 - viii) Somatic embryogenesis
 - ix) Somaclonal variation
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