

2017

BOTANY – HONOURS

Sixth Paper

Full Marks – 100

*The figures in the margin indicate full marks**Candidates are required to give their answers in their own words as far as practicable*

Module - XI

(50 Marks)

1. Answer the following questions :

- (a) Name one gene present in cpDNA and in mt DNA. 1
- (b) What is ribozyme ? Give one example. 2
- (c) What is MPF ? Mention its function. 2
- (d) Distinguish between symmetric and asymmetric karyotype. 2
- (e) What is Student's 't' test ? Give formula. 2
- (f) Mention two types of DNA markers used in molecular breeding. 1

2. How is the spindle apparatus formed during cell division ? Illustrate the dynamics of chromosome movement during anaphase with reference to anaphase Promoting Complex (APC). Why are the chromosome termini not digested by exonuclease activity ?

5+8+2

Or

Write short notes of the following :

5×3

- (a) Structure and function of nuclear pore complex.
- (b) Ribosome biogenesis.
- (c) Origin of eukaryotic cell.

3. Answer *any two* of the following :

- (a) What do you mean by 'cms' ? — Explain. Why male sterile lines are important in plant breeding ? 2+3
- (b) What is back cross method ? How will you transfer a dominant gene into a high yielding variety ? 2+3
- (c) Explain Hardy-Weinberg genetic equilibrium and mention the factors affecting it. 5
- (d) The grain length of a variety of rice is given below :

Grain length (mm)	9-11	12-14	15-17	18-20
No. of grains	3	5	9	3

Calculate the mean and standard error of mean of grain length of the variety.

2+3

[Turn Over]

4. With suitable flow charts illustrate the steps for anther culture and pollen culture techniques. Which one is more advantageous and why ? Discuss the importance of haploid culture. (4×2)+2+5

Or

Answer the following :

5×3

- (a) Essential components of plant tissue culture medium.
- (b) Artificial seed production and its significance.
- (c) Mention the achievements of transgenic plant production.

Module - XII

(50 Marks)

5. Answer the following questions :

- (a) Write down the gametes from AaBbCc. 1
- (b) Give an example of a type of gene interaction that can modify the Mendelian Dihybrid Ratio. 2
- (c) A plant has a chromosome number $2n = 14$. What is its linkage group ? 1
- (d) Explain "Wobble Hypothesis" with a suitable example. 2
- (e) What are the differences between reciprocal translocation and crossing over ? 2
- (f) What is split gene ? 2

6. Discuss in brief **any two** of the following :

5×2

- (a) Explain the ABC model of flower development in *Arabidopsis*.
- (b) Write down the process of PCR and its two application.
- (c) Write a short note on one gene – one polypeptide concept.
- (d) "Crossing over involves a physical exchange between segments of homologous chromosomes during meiosis" – How was this hypothesis experimentally proved in maize ?

7. Answer **any two** of the following :

- (a) What is an operon ? Distinguish between inducible and repressible operon. Explain the mechanism of positive and negative control in *lac* operon with suitable diagram. 2+3+10
- (b) Enumerate briefly the roles of different enzymes in DNA replication. Describe the mechanism of origin of transcription of RNA in prokaryotes. Give a brief idea of RNA processing in Eukaryotes. 7+3+5
- (c) What do you mean by transition and transversion ? Discuss the molecular mechanism of the following mutagens in causing mutation : 3+(3×4)
 - (i) UV rays, (ii) 5-BU, (iii) HNO_2 , (iv) EMS.

(d) A cross is made between a heterozygote YDE/yde and a recessive yde/yde. Progenies were analysed and following results were obtained :

<i>Phenotype</i>	<i>Genotype</i>	<i>Number</i>
1. Yellow, dry, elongated	YDE	358
2. Purple, juicy, round	yde	346
3. Yellow, dry, round	YDe	44
4. Purple, juicy, elongated	ydE	44
5. Yellow, juicy, round	Yde	104
6. Purple, dry, elongated	yDE	92
7. Yellow, juicy, elongated	YdE	8
8. Purple, dry, round	yDe	4

- (i) Determine the gene order and map distance between the genes.
 (ii) Find out the co-efficient of co-incidence and interference.

(2+10)+(2+1)