2020

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

(Marks : 50)

1. Answer the following questions :

(a) What is MPF? State its functions. 2

(b) What is meant by an asymmetrical karyotype? 1

(c) What is NOR? What is its function? 2

(d) What do you mean by endosymbiotic theory? Give an example in support. 2

(e) What are the factors that affect Hardy-Weinberg equilibrium? 2

(f) What is Null Hypothesis? 1

2. Answer *any one* of the following :

(a) (i) Describe the structure of nucleus of an eukaryotic cell with special emphasis on the nuclear envelope, nuclear lamina and the nuclear pore complex.

   (ii) Write a brief note on the packaging of DNA on the basis of nucleosome concept. 18+12

(b) Write short notes on the following : 10×3

   (i) Importance of different checkpoints in cell-cycle progression with examples.

   (ii) Genetic material of the organelle involved in cms.

   (iii) Centromere and Kinetochore.

(c) What is Somatic hybridization? Discuss, in brief, the methods of somatic hybrid production. Describe the different fusion products obtained after somatic hybridization in culture. Define osmoticum with example and state its role. 2+10+10+4+4

Please Turn Over

(d) Answer the following :

    (i) Write the essential components of plant tissue culture medium.   10

    (ii) Define artificial seed. Explain the types of artificial seeds and state its importance. 2+6+2

    (iii) Explain the method of induction of callus and state its importance.   8+2

3. Answer *any one* of the following :

(a) Calculate the mean, standard deviation and standard error from the following observations :   10

Observation No.	Increase in dry weight (in mg)
1	4.25
2	4.20
3	4.15
4	3.35
5	3.25
6	4.70
7	3.25
8	3.75
9	3.70
10	3.90

(b) What is Hybrid Vigour? Explain the genetic basis of Heterosis.   2+8

(c) Discuss the merits and demerits of mass selection and pure-line selection. What is inbreeding depression?   8+2

(d) What is back cross method? What are its applications in plant breeding?   4+6

Module - XII
(Marks : 50)

4. Answer the following questions :

(a) Give an example of a Base analogue. Why is it so called?   1+1

(b) What is Homeotic gene? Give an example.   2

(c) What is YAC?   1

(d) What is an operon? Give one example.   2

(e) Cite one example of a marker gene.   1

(f) Why does the lagging strand of DNA replicate discontinuously?   2

5. Answer *any one* of the following :

(a) Discuss, in brief, the polygenic inheritance in plants.   10

(b) Discuss, in brief, the molecular mechanism of mutations caused by **5-BU** and $\mathbf{HNO_2}$.   5×2

(c) Draw and discuss the molecular mechanism of crossing over following single-strand nick.   10

(d) Discuss the meiotic behaviours of pericentric and paracentric inversions. Which one, according to you, is more fatal and why?   8+2

6. Answer *any one* of the following :

(a) Define gene cloning and enumerate the properties of an ideal gene cloning vector. Give an outline of gene cloning technique. What are ORFaus genes? Write a short note on different types of proteomics.   10+10+2+8

(b) What is meant by aminoacylation of tRNA? Discuss the mechanism of translation in prokaryotes with neat diagrams.   6+24

(c) (i) What do you mean by Pseudogene? Explain the test of complementation in rII locus.

   (ii) Distinguish between Dominant and Recessive epistasis with examples. How do they differ from Mendelian inheritance?   (12+2)+(12+4)

(d) A cross was made between purple leaf (pl), glossy seedling (g), dwarf variety (t) and wild (+++) type. F_1 plants were test-crossed and following proportions were obtained when a sample of 1000 plants were counted :

Wild	310
Purple leaf, Glossy seedling, Dwarf	305
Purple leaf	140
Glossy seedling, Dwarf	145
Purple leaf, Dwarf	42
Glossy seedling	43
Dwarf	9
Purple leaf, Glossy seedling	6

Draw a linkage map showing the order and distance of three genes. Calculate the coefficient of coincidence and interference.   20+6+4

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