

M.Sc. BOTANY
SECOND SEMESTER
CYTOLOGY, GENETICS & PLANT BREEDING
MSB – 203

(Use Separate Answer Scripts for Objective & Descriptive)

Duration: 3 hrs.

Full Marks: 70

(PART-A: Objective)

Time: 20 min.

Marks: 20

Choose the correct answer from the following:

1X20=20

1. Homozygosity and heterozygosity of an individual can be determined by?
 - a. Test cross
 - b. Back cross
 - c. Self-fertilization
 - d. All of these
2. Bulk population breeding is suitable for
 - a. Fruits
 - b. Small grains
 - c. Vegetables
 - d. Flowers
3. The initial gene pool of a composite population is composed of
 - a. Inbred lines
 - b. Isolines
 - c. Purelines
 - d. Single plants-derived from crosses and/or germplasm lines
4. Pure line selection is also called
 - a. Inbred selection
 - b. Progeny selection
 - c. Single line selection
 - d. All of these
5. Pick out the odd pair
 - a. Mass selection - Morphological characters
 - b. Purline selection - Repeated self pollination
 - c. Clonal selection - Sexually propagated
 - d. Clonal selection - asexually propagated
6. Desired improved variety of economically useful crops are raised by
 - a. Natural Selection
 - b. mutation
 - c. hybridization
 - d. biofertilisers
7. Pedigree selection is used in _____?
 - a. Self pollinated plants
 - b. Cross pollinated plants
 - c. Plant difficult to hybridized
 - d. Vegetatively propagated plants
8. Composite are developed by using
 - a. Advanced generation seed mixtures obtained from high yielding intervarietal or interracial crosses
 - b. Hybrid directly from intervareietal crosses
 - c. Recurrent selections for specific combining ability
 - d. The hybrid of an inbred with an open pollinated variety

9. All the statements are true regarding RFLP and RAPD except
- RAPD is a quick method compared to RFLP
 - RFLP is more reliable than RAPD
 - Species specific primers are required for RAPD
 - Radioactive probes are not required in RAPD
10. The variation in number of tandem repeats between two or more individuals is called
- Variable number of tandem repeats (VNTRs)
 - Restriction Fragment Length Polymorphism (RFLP)
 - Simple sequence repeats (SSRs)
 - Amplified Fragment Length Polymorphism (AFLP)
11. Which of the following statements is true about the metaphase?
- A chromosome is the thickest during the metaphase
 - A chromosome is the shortest during the metaphase
 - A chromosome is the longest during the metaphase
 - Both (a) and (b)
12. Balbiani rings are found in
- Heterosome
 - Lampbrush chromosome
 - Autosome
 - Polytene chromosome
13. Centrosome duplication takes place in this phase
- S phase
 - G1 phase
 - G0 phase
 - M phase
14. Protein kinase A is _____
- Completely inhibited by cyclic AMP
 - Allosterically activated by cyclic AMP
 - Affected by cyclic AMP only under unusual circumstances
 - Activated by covalent binding of cyclic AMP
15. Which second messenger signals the release of Ca^{+2} from endoplasmic reticulum?
- IP3
 - 1, 2 diacyl glycerol
 - cAMP
 - cGMP
16. GPCR is comprised of _____
- Alpha helices and beta sheets
 - Alpha helices and beta turns
 - Transmembrane helix
 - Loops and turns
17. Upon binding of ligand
- CBP is inactive and CRE transcription on
 - CBP active CRE transcription on
 - CBP inactive CRE transcription off
 - CBP active CRE transcription off

18. In mouse agouti locus is hypostatic to pigment development locus. If C is for pigment development, and A is for agouti, and recessive alleles in agouti locus gives black colour and recessive in pigment locus gives white colour, what will be the phenotype of A/- c/c and a/a c/c.
- a. Agouti, white
 - b. Black, agouti
 - c. Black, black
 - d. White, white
19. Which of the following ratio shows complementary gene interaction?
- a. 9:7
 - b. 15:1
 - c. 12: 3 : 1
 - d. 9:3:4
20. Which of the following catalyzes the cutting of PIP₂ into 2 moles of IP₃ and diacylglycerol in cell signaling?
- a. Phosphokinase C
 - b. Phospholipase C
 - c. Protein kinase C
 - d. Phosphodiesterase C

(PART-B :Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

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| 1. Describe the procedure of backcross method for the transfer of a dominant gene. Discuss the merits and demerits of the backcross method of breeding. | 5+5=10 |
| 2. Write notes on the following molecular markers (i) SSR (ii) SNPS | 5+5=10 |
| 3. Briefly describe the various operations in the production of synthetic varieties. How are synthetic varieties maintained? | 5+5=10 |
| 4. Describe the different types of recurrent selection for crop improvement. | 10 |
| 5. Briefly describe about the cell cycle. | 10 |
| 6. Write small notes on GPCR signalling pathways. | 10 |
| 7. Write small notes on:
a. Dominant epistasis
b. Supplementary gene interaction | 5+5=10 |
| 8. Briefly describe the Extra Nuclear Inheritance along with examples. | 10 |

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