

**FIJI NATIONAL UNIVERSITY****College of Agriculture, Fisheries & Forestry****Bachelor of Science in Agriculture, Trimester II Final Examination - 2017****GPB 705: Application of Biotechnology in Field Crops Breeding****Time Allowed: 3.00 hours (including reading time) Total Marks: 100****INSTRUCTIONS:**

1. This paper consists of **seven** pages including **two** pages of Answer Sheets.
2. Please check to see that all your paper is complete.
3. Answer all the Objective Type Questions on the Answer Sheets and Descriptive Type Questions in the Answer Booklet only.
4. **NO** written or printed material and mobile phones are allowed in the examination hall.
5. Marks allocated for each question appears at the side of each question so allocate your time accordingly.
6. This paper is divided into **Two (2)** parts. First part contains Objective Type Questions which is having **four (4)** Sections – A, B, C, and D. Second part is Descriptive Type which has **six (6)** questions. All questions are compulsory.

I. OBJECTIVE TYPE QUESTIONS (40 Marks)**To be answered only on the Answer Sheet.**

Section A: Fill in the blanks. (10 Marks)

Section B: Multiple choice Questions. (10 Marks)

Section C: Write True or False. (10 Marks)

Section D: Match the following. (10 Marks)

II. DESCRIPTIVE TYPE QUESTIONS (60 marks)

There are **six (6)** descriptive type questions, please provided short and precise answers. Please write on the Answer Booklet according to the order of the questions. Answer every question from a new page to facilitate evaluation.

Student ID No.:

Date.....

I. OBJECTIVE TYPE QUESTIONS

Note: Answer only on the Answer Sheet.

Time: 60 Minutes

Total Marks: 40

A. Fill in the blanks.

(10x1=10 Marks)

1. _____ is a cell characteristic, in which the potential for forming all the cell types in the adult organism are retained.
2. _____ is widely used to produce clones of a plant in a method known as micropropagation.
3. _____ is the use of living systems and organisms to develop or make products.
4. _____ has been formed artificially by combining constituents from multiple sources, creating sequences that would not otherwise be found in the original genome.
5. _____ is a gene introduced into a vector system that confers a trait suitable for artificial selection usually antibiotic resistance.
6. _____ refers to contraction of the protoplast of a plant cell as a result of loss of water from the cell.
7. Potassium chloride, calcium chloride and magnesium phosphate are the _____ in use to maintain osmotic pressure.
8. _____ are defined as genetic variations in plants that have been produced by plant tissue culture and can be detected as genetic or phenotypic traits.
9. _____ is a non-zygotic embryo formed in tissue cultures.
10. RAPD markers stand for _____ makers.

B. Multiple choice questions: Select the correct answer. (10x1=10 Marks)

11. Recombinant DNA technology uses which type of bacterial DNA to carry the DNA of interest for cloning and multiplication?
 - a. Mitochondria .
 - b. Extracellular.
 - c. Nucleolus.
 - d. Plasmid.
12. Surface sterilization usually use which of the following chemical combination to submerge plant tissues in various concentrations and durations?
 - a. Methanol and sodium chloride.
 - b. Ethanol and sodium phosphate.
 - c. Ethanol and sodium hypochlorite.
 - d. Methanol and sodium hypochlorite.

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13. Which of the following is the backbone of modern plant biotechnology?
- Recombinant DNA technology.
 - Plant tissue culture.
 - Plant genomics.
 - Polymerase chain reaction.
14. Which of the following refers to each of two or more enzymes with identical function but different structure?
- Isozyme.
 - Lysozyme.
 - Exoenzyme.
 - Holoenzyme.
15. Plant tissue culture is widely used to produce clones of a plant in a method known as?
- Macropropagation.
 - Micropropagation.
 - Monopropagation.
 - Multipropagation.
16. Protoplast isolation can be achieved by which of the following method?
- Electronic isolation.
 - Mechanical isolation.
 - Enzymatic isolation.
 - Both b and c.
17. In restriction enzyme cleavage, which best describes an end of a DNA double helix at which a few unpaired nucleotides of one strand extend beyond the other?
- Extended end.
 - Blunt end.
 - Sticky end.
 - Uneven end.
18. Which of the following best describes the process of transferring genetic material from the same species to a host.
- Cisgenesis.
 - Transgenesis.
 - Dysgenesis.
 - Anagenesis.

19. Which of the following does NOT belong to the physical plant transformation method?

- Microinjection.
- Particle bombardment.
- PEG.
- Electroporation.

20. If you use two restriction enzymes cleaved a plasmid vector, pBR322 right on the *tet* gene, and ligated a foreign gene onto it. What will happen to the *tet* gene?

- Nothing, the old *tet* runs as usual.
- Slower, the old *tet* runs because the addition of foreign gene.
- Faster, due to the addition of foreign gene.
- Stop, the old *tet* has been inactivated.

C. Check 'True' or 'False'.

(10x1=10 Marks)

	Statement
21.	Epigenetic type of somaclonal variation is caused by permanent phenotypic changes.
22.	Low auxin/cytokinin ratio is suitable to induce cell divisions while high cytokinin/auxin ratio is required for regeneration.
23.	The controlled use of biological agents such as microorganisms or cellular components for beneficial use is termed as plant biotechnology.
24.	Genetic engineering (recombinant DNA) technology cannot transfer genetic materials between unrelated organisms.
25.	Magnesium (Mg) is a part of chlorophyll molecules.
26.	The physiological age of the explant plays an important role in organogenesis.
27.	T-DNA in <i>Agrobacterium</i> stands for tumor inducing DNA.
28.	DNA markers detect polymorphisms in DNA sequences.
29.	Restriction enzymes is an enzyme that cleaves DNA into fragments only at specific recognition sites within the molecule known as restriction sites.
30.	In gel electrophoresis, DNA fragments run from positive charge to negative charge.

D. Match the following

(10x1=10 marks)

31.	Matthias Jakob Schleiden (1838) and Theodor Schwann (1839)	A	Biodegradable products
32.	Murashige and Skoog(1962)	B	Micro-element
33.	Amp ^R protein	C	Anther and pollen culture
34.	Haploid plants	D	Ampicillin resistance
35.	Polyhaploids	E	Tandem repeats
36.	Environmental biotechnology	F	Physiological malformation
37.	DNA markers	G	The cell theory
38.	Microsatellites	H	Gel electrophoresis
39.	Cobalt (Co)	I	MS medium
40.	Hyperhydricity	J	Common wheat

II. Descriptive type Questions

(60 Marks)

Note: Please provide short and precise answers. Each question is ten marks.

1.	Please describe three types of genetic modified organisms (GMO) and the purposes for their genetic changes.	10
2.	Please describe the approaches used to identify microsatellite markers.	10
3.	Please describe the common features of a cloning vector.	10
4.	Please describe the procedures to create a transgenic plant.	10
5.	Please describe protoplast applications in crop improvement.	10
6.	Please provide formulas to calculate the following. Boric acid (H_3BO_3), (B=11, H=1, O=16). a) What is the molecular weight of boric acid? b) Preparing a 500 ml of 10 M boric acid stock solution, how much boric acid will be needed? c) Make a dilution to obtain 100 ml of 1 M boric acid, how much 10 M stock solution will be needed?	10

The End

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