



**MASENO UNIVERSITY**  
**UNIVERSITY EXAMINATIONS 2013/2014**

**FOURTH YEAR SECOND SEMESTER EXAMINATIONS FOR THE  
DEGREE OF BACHELOR OF SCIENCE IN MEDICAL  
BIOTECHNOLOGY WITH INFORMATION TECHNOLOGY  
(MAIN CAMPUS)**

**PMB 449: APPLICATIONS OF BIOTECHNOLOGY IN  
MEDICINE**

Date: 8<sup>th</sup> April, 2014

Time: 2.45 – 5.00 p.m.

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**PMB 449: APPLICATIONS OF BIOTECHNOLOGY IN MEDICINE**

**SECTION A**

**Answer ALL the questions in this section (15 marks)**

1. Plasmids are vectors for gene cloning because they:
  - A. Self replicate in bacterial cells
  - B. Replicate freely outside bacterial cells
  - C. Can be multiplied in culture
  - D. Can be multiplied in laboratories using enzymes
2. Genetically engineered bacteria are mainly being used in commercial production of
  - A. Monoclonal antibodies
  - B. Molecular water
  - C. Human insulin
  - D. Genetic fingerprints
3. Which of the following is not tool of genetic engineering?
  - A. Vectors
  - B. Enzymes
  - C. Foreign DNA
  - D. GMO
4. In forensic science which of the following is used?
  - A. Bacterial cloning
  - B. DNA foot printing
  - C. DNA fingerprinting
  - D. DNA cloning
5. In recombinant DNA technology a plasmid vector is cleaved by
  - A. Modified DNA ligase
  - B. A heated alkaline solution
  - C. The same enzyme that cleave the donor DNA
  - D. The different enzyme other than that cleave the donor DNA
6. The following describes a technique of vector delivery for gene therapy; first, the normal genes are cloned into the vector. Next, the cells with defective genes are removed from the patient and are mixed with genetically engineered vector. Finally the transfected cells are re-infused in the patient to produce protein needed to fight the disease. Which technique is described above?
  - (A) Ex-vivo gene delivery
  - (B) Germ-cell gene therapy
  - (C) In-vivo gene delivery
  - (D) Sonoporation
7. The enzyme taking part in joining two ends of DNA is

- A. Ligase
- B. Polymerase
- C. Gyrase
- D. DNase

8. The following are therapeutic applications of monoclonal antibodies **except**
- A. Immunotoxins to specific cancer/neoplasma
  - B. Classification of 'Blood Groups' in humans e.g., ABO, Rh
  - C. Used for passive immunity against diseases
  - D. Conjugated to radioactive material to target certain tumour cells
9. Which of one the immunological methods is used for cell enumeration, cell identity and sorting?
- A. Flow cytometry
  - B. Enzyme-linked immunosorbent assays.
  - C. Radioimmunoassay
  - D. ELISPOT
10. Polyethglycol (PEG) in Hybridoma technique is used to:
- A. Culture B-lymphocytes
  - B. Kill B-cell hybridomas
  - C. Fuse B-lymphocytes to myeloma cells.
  - D. Immortalize B-lymphocyte
11. Which of the following is true of monoclonal antibodies?
- A. Antibodies obtained from one parent and for one antigen
  - B. They are obtained from different parents and for one antigen
  - C. They are obtained from one parent and for many antigens
  - D. Are obtained from many parents and for many antigens.
12. Which one is true about tissue typing:
- A. Next generation sequencing (NGS) cannot be applied for HLA typing
  - B. DNA based methods are less sensitive, less accurate and highly erroneous
  - C. Bead based technology such as flow cytometry can be used in tissue typing
  - D. HLA typing cannot be used for post-transplantation monitoring
13. Primary culture refers to:
- A. The stage under which cells reach confluence
  - B. Cells that have been transformed and are immortal
  - C. Cells that are disintegrated only enzymatically
  - D. The stage at which cells have reached senescence
14. The following are applications of Biotechnology in medical practice **except**
- A. Identification of suspected rape criminals
  - B. Production of biopharmaceuticals
  - C. Treatment of Parkinson's disease through gene therapy

- D. Production of drought resistant crops
15. In which of the following would you apply cell cultures
- A. For cDNA library screening
  - B. During reverse transcriptase PCR (RT-PCR)
  - C. Tissue typing using molecular methods
  - D. Testing the cytopathic effects of viruses on cells

### Section B

Answer ALL the questions in this section (15 marks)

*Use illustrations where necessary*

**Question 1:** Explain **TWO** characteristics of cells used in Hybridoma technology (5 marks)

**Question 2:** Define the following terms as applied in medical biotechnology (5marks)

- a. Continuous cell lines
- b. Multiple cloning sites
- c. Ex-vivo gene therapy
- d. Biosensor
- e. Antisense Technology

**Question 3:** Describe the legal and ethical issues that surround the application of biotechnology inventions in medicine (5 marks)

### SECTION C

Answer **ONLY** any **TWO** questions in this section (30 marks)

**Question 5**

Describe how the application of polymerase chain reaction (PCR) has contributed to success in medicine (15 marks)

**Question 6**

Cell and tissue culture play a critical role in biotechnology, explain the how cell and tissue culture enhances biotechnology (15 marks).

**Question 7**

How have inventions in Biotechnology impacted in Medicine and its allied fields? (15 marks)