ELIZADE UNIVERSITY,

ILARA-MOKIN,

ONDO STATE

FACULTY: BASIC & APPLIED SCIENCES

DEPARTMENT: BIOLOGICAL SCIENCES

SECOND SEMESTER EXAMINATION

2014/2015 ACADEMIC SESSION

COURSE CODE: BTH 202

COURSE TITLE: INTRODUCTION TO GNETIC ENGINEERING II

DURATION: 2 HR

HOD's SIGNATURE

NAME:.....MAT. No:.....

INSTRUCTIONS

Section A: Answer all.

Section B: Answer all.

SECTION C: COMPULSORY.

Section A:

Question I. Choose the best answer (30 marks)

1. Animal or plant breeding's ultimate goal is to the improve genetic merit of an animal or plant by using a. modern biotechnology b. conventional breeding c) a and b methods.
2. Restriction mapping involves mapping restriction sites in a genome that can be revealed by electrophoresis, after which a) Sothern blotting b) autoradiography © sequencing (d) and b (e) c and d) are done .
3. *In situ* hybridization is direct gene localization on chromosome spreads using (a) autoradiography (b) physical mapping © sequencing (d) restriction mapping
4. a) Sequencing (b) Marker-assisted selection (c) site-directed mutagenesis (d) bioinformatics improves breeding by identifying short oligonucleotide landmarks in the genome close to genes controlling a particular trait in parents and inherited with the genes in the young progeny .

5. a) S-blot, (b) N-blot, c) W-blot (d) all of the above cannot be done without electrophoresis.
6. To know whether one succeeds in producing a transgenic organism, one has to do screening methods like (a) replica plating, (b) electrophoresis, (c) S-blot, (d) autoradiography, (e) sequencing (f) PCR (g) a, b,c (h) d,e,f (i) all of the above

7. Recombinant technology (b) Ligation (c) PCR (d) Transgenesis involves the DNA being the genetic material where 2 DNAs can be digested and ligated together to produce a particular protein (or trait) not originally present in the host DNA.

8. Native PAGE differs from SDS-PAGE in that it uses reducing agents like (a) acrylamide (b) Sodium dodecyl sulfate (c) Ethidum bromide (e) agarose to break polypeptides.

9. Cloning in plants differs from cloning in animals because it uses (a) retroviruses (b) bacteriophages (c) Ti plasmid (d) cosmids (e) Yeast vectors that contain genes that will enable it to infect the host genome.

10. Beta and gamma radiations both produce radioactive (a) electrons (b) protons (c) neutrons that can be used as tracers or molecular labels .

11. Transcription and translation differ from each other in that both (a) messenger RNA (b) transfer RNA (c) sRNA (d) a and b (e) a,b,c are involved.

Question II . Given below are 3 fragments cleaved from the same gene (5 marks)

DNA Fragment 1: 5' T TAA AAA TAC 3'

DNA Fragment 2: 3' TTT AAA GGC CGG 5'

DNA Fragment 3: 5' CCC CCG GCA CAT 3'

a) Construct the mRNA; remember transcription produces a 5' to 3 mRNA from a 3 to 5' template underlining the start and termination codons. To identify the first fragment look for a start codon in the 3' end; to identify the last segment look for a 3' to 5' sequence corresponding to any of the termination codons. (5 marks)

b) complementary strand

© how long is the protein formed

Question III. Use the picture below to answer the questions that follows.

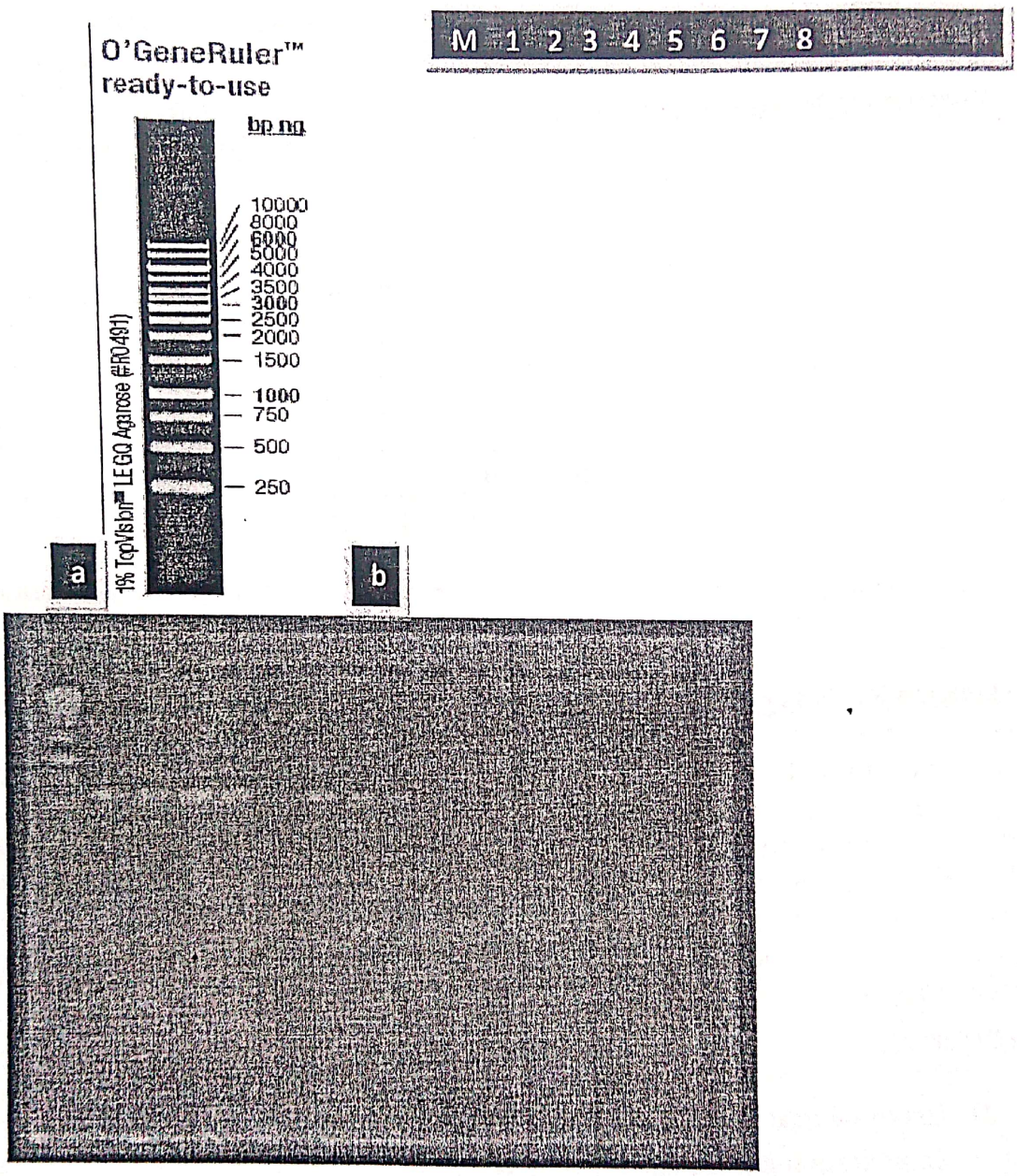


Fig 1. **a.** represent a 1Kbp DNA size ladder. **b.** M- DNA marker or ladder the same as in **A,** Lane 1 - 8 shows the position of a PCR product on an agarose gel.

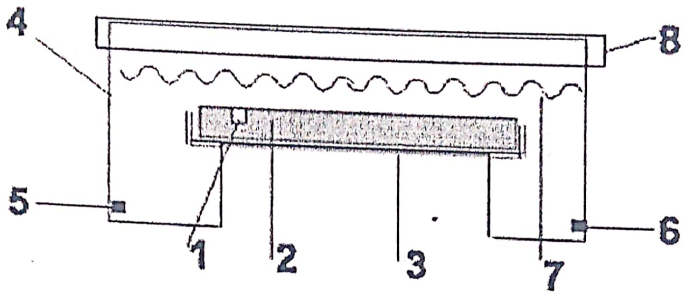
I. Using the picture above, compare the position the PCR product to the DNA size ladder and determine the size of the amplicon.

II. Describe how you could prepare 1.5% w/v of agarose gel for electrophoresis

III. During the preparation of the agarose gel, DNA staining dye was added to the gel before cooling, explain why this is necessary and give example of such dye.

IV. Why is it necessary to exercise precaution (use of gloves and goggles) when handling a certain DNA staining dye (e.g. Ethidium bromide)?

Question IV. Use the diagram below to identify the following structures labelled 1 to 8.



Question V .· Essay. Answer briefly and concisely:

1. Describe the steps in DNA recombinant technology.
2. In the selection of bacterial colonies that carry cloned DNA in plasmids, such as pBR 3222, that contain two antibiotic resistance genes, discuss the steps briefly
3. Describe 3-5 steps in the following molecular genetics tools:
    a. Marker-assisted selection
    b. Polymerase chain reaction

Section B:

1) List three next generation sequencing methods.
2) Enumerate the three components of Genomics.
3) State three uses of transgenesis.
4) Mention three Bioinformatics data.
5) Give three types of physical mapping techniques you know

(ESSAY TYPE QUESTIONS)

6 a) Explain three similarities and three differences between the Sanger's and automated DNA sequencing methods.
b) Give three areas where Bioinformatics can be applied.
c) Mention three differences between genetic and physical mapping.

7 a) Differentiate between transgenesis and cisgenesis. Give three advantages of transgenesis over the conventional breeding method.
b) Define plant transformation and briefly explain the classes of DNA transfer methods.
c) State the two goals of Genomics as a scientific discipline.

Section C:

Short answer questions

1. What is a gene (ii) List the steps that are involved in gene expression

2. Differentiate between a constitutive and an inducible gene

3. What is an operon (ii) under what nutrient condition does the lac operon of *Escherichia coli* become active

4. List four techniques that can be used in protein extraction and purification

5. Differentiate between patent and copyright

Essay type

6, Define and discuss the importance of (i) bio-safety and(ii) bio-security in biotechnology industry

7. Describe four chromatographic methods used for protein purification

End of exam ----------100 marks