Parvatibai Chowgule College of Arts and Science
Autonomous

B.Sc. Online Semester End Examination, January 2022

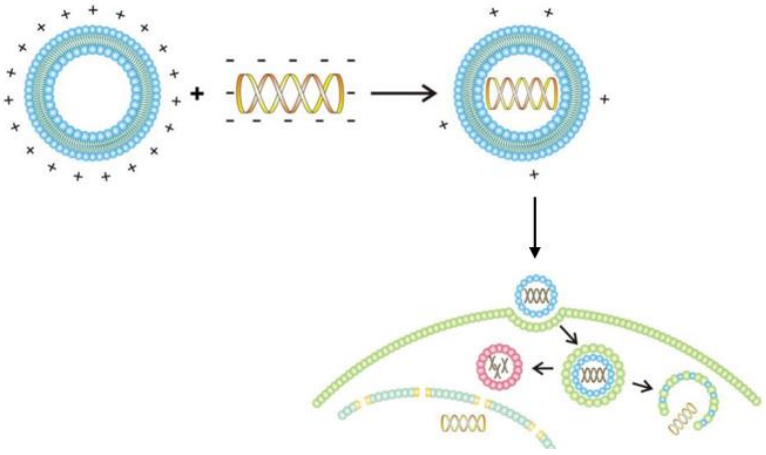
Semester: III
Subject: Zoology
Title: Basic Microbiology and Fundamentals of Animal Biotechnology (Elective)
Duration: 2 Hours Max. Marks: 45

Instructions: *1. Figures to the right indicate full marks.*
2. Draw diagrams wherever necessary.
3. All main questions are compulsory.

Q1) Answer <u>ANY THREE</u> of the following: (09)

a) A bacterial staining technique 'X' helps to differentiate between two groups of bacteria based on their cell wall constituents. Identify the staining technique 'X'. How do the two groups of bacteria differ from one another? State the applications of the chemicals used in this staining technique.

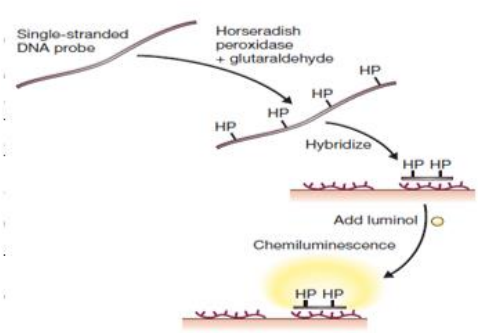
b) Given below is an image of a gene transfer method. Identify and explain the principle of the method and highlight its advantages.



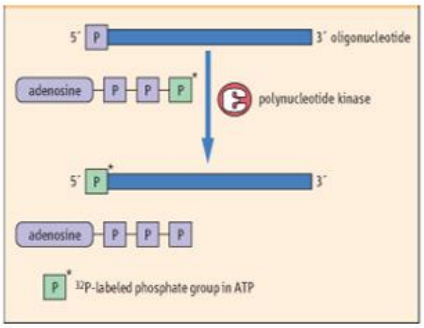
c) Identify the cluster of bacteria i, ii, iii and iv from the image given below. Classify the bacteria i and ii based on their morphology.

P.T.O

d) Study and identify the techniques seen in images A and B given below. Highlight the merits and demerits of each technique.



A



B

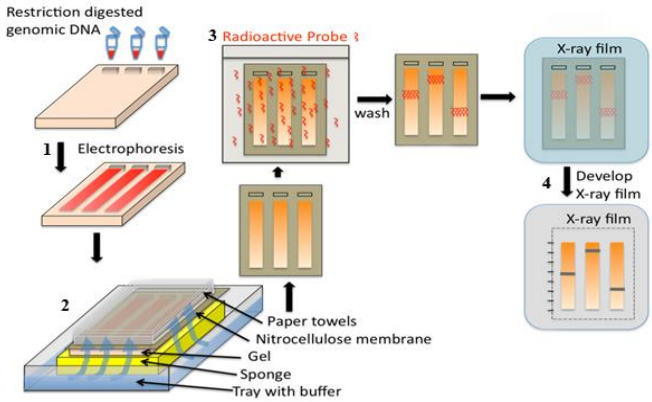
Q2) Answer <u>ANY TWO</u> of the following: **(12)**

a) Analyze the images 'X' and 'Y' given below and explain the role of microorganisms to obtain these products. Add a note on the importance of microorganisms in bioassay.

X

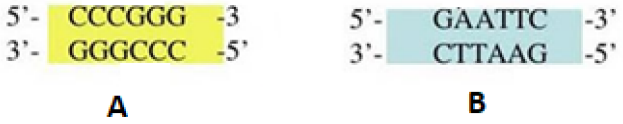
Y

b) Given below is a schematic representation of a technique. Identify, highlight the objective and importance of the technique. In detail, explain the steps marked as 1, 2, 3 and 4 carried out during the procedure.



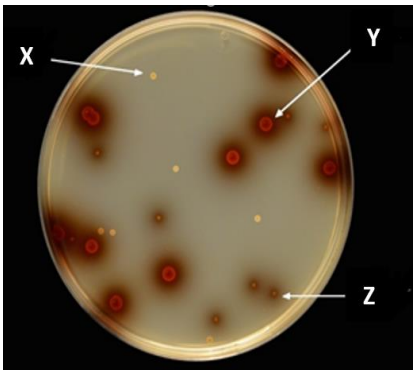
P.T.O

c) Analyze the DNA fragments, A and B from the image given below. Identify the restriction enzymes that can be used to cleave these two DNA fragments. How does the mechanism of cleavage differ in these restriction enzymes? Add a note on the nature of cuts formed in the DNA fragments A and B.

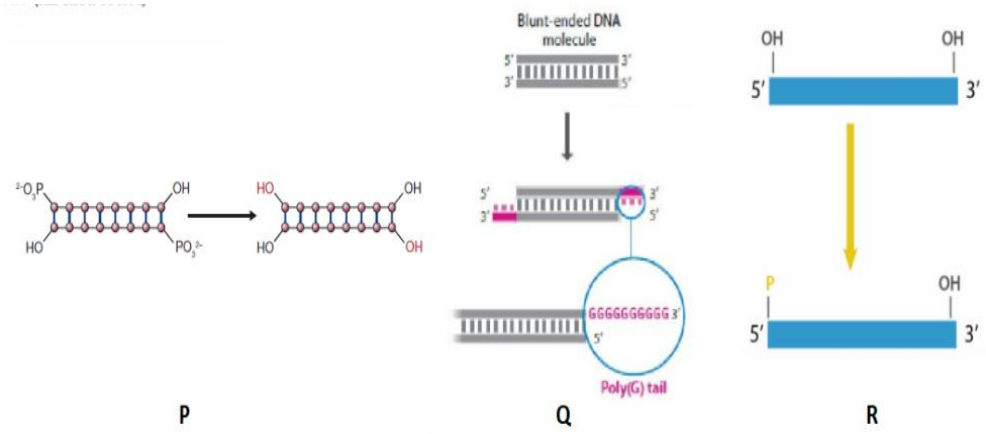


Q3) Answer <u>ANY TWO</u> of the questions given below: **(12)**

a) Tom was assigned to grow *Staphylococcus aureus*, *Enterococcus faecalis* and *Klebsiella pneumoniae* for a microbiology experiment. He set up the microbial cultures for all three bacteria separately. When he observed the culture plates, he found three types of colonies (X, Y and Z) on his plate marked as *Klebsiella*. Explain the different microbial procedures that he can follow to obtain a pure culture of *Klebsiella* from the contaminated culture.



b) With reference to the images given below (P, Q and R), comment on the enzymes responsible for these steps of genetic engineering.

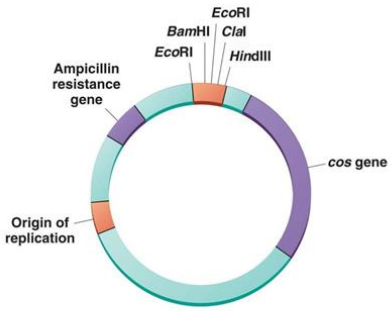


c) You have been provided with two different bacterial cultures, A and B. Bacterial culture A consists of lactose fermenting and lactose non-fermenting gram-negative bacteria whereas bacterial culture B consists of pathogenic *Staphylococci*. Identify and comment on the types of culture media that can be considered for A and B. On what basis do you select the type of culture media to be used in an experiment?

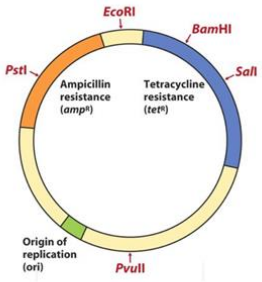
P.T.O

Q4) Answer <u>ANY ONE</u> of the questions given below: **(12)**

A) Identify on the cloning vectors X and Y in the images given below. Differentiate between the two cloning vectors with respect to the size of inserts and key restriction sites. Can the cloning vector Y be used to derive any other vectors? If yes, explain in detail. With the help of examples, describe the role of vector Y in medical biotechnology.



X



Y

<u>OR</u>

B) In the given hypothetical situation, you are an assistant to a scientist in a forensic laboratory. Trace amounts of sample (hair) as evidence was collected from the crime scene and given to the laboratory.
   a) Explain the technique you would apply in recent times to amplify the trace amount of sample for further investigation. Add a note on how this technique can be used in other fields of science.
   b) With the help of a neat diagram, briefly explain how amplification of genetic material was done in the olden times.

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