NUI Galway
OÉ Gaillimh

Semester I Examinations 2009 / 2010

Exam Code(s)	3BS9
Exam(s)	3rd Year Science Examination
Module Code(s)	MI316
Module(s)	Industrial and Environmental Microbiology
Paper No.	1
External Examiner(s)	Dr. John P. Quinn
Internal Examiner(s)	Professor Vincent O'Flaherty Dr. Thomas Barry
Instructions	**Answer 5 Questions** **Please indicate clearly the numbers of the questions answered on the first page of your answer book**
Duration	3 Hours
No. of Pages	1
Department(s)	Microbiology
Requirements	None

Co-ordinator Requirements

MCQ
Handout
Statistical/Log Tables
Cambridge Tables
Graph Paper
Log Graph Paper
Other Materials

Release to Library: Yes √ No

Q1. Write an essay entitled "Epidemics: origins, monitoring and control". Use the examples of bubonic plague, smallpox or influenza to illustrate your answer.

Q2. Write an essay on syphilis, include in your answer a discussion of:

1. the causative agent;
2. transmission of the disease;
3. the development of the different stages of syphilis infections and;
4. methods used to prevent its spread.

Q3. Write an essay on "Industrial Media for use by bacteria". In your answer, compare and contrast crude and defined media for use with industrial fermentations.

Q4. Compare and contrast the use of filtration and ionizing radiation for achieving sterility in industrial processes

Q5. Microbiology plays an important role in the production of alcoholic beverages. Discuss this statement with reference to either beer or wine production. In your answer discuss the key biochemical steps involved in ethanol production.

Q6. "Food-borne intoxications can be caused either by bacteria or fungi." Discuss this statement with reference to one bacterial agent and one fungal agent.

Q7. "Water can act as a vector for disease-causing microorganisms". Discuss.

Q8. Describe the significance and current model for the formation of a bacterial biofilm, using experimental examples to illustrate your answer.

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Semester II Examinations 2009 / 2010

Exam Code(s)	3BS9
Exam(s)	3rd Year Science Examination
Module Code(s)	MI317
Module(s)	Molecular and Cellular Microbiology
Paper No.	Paper No. 1
External Examiner(s)	Dr. John P. Quinn
Internal Examiner(s)	Professor Vincent O'Flaherty *Dr. Thomas Barry
Instructions	**Answer FIVE Questions** **Please indicate clearly the numbers of the questions answered on the first page of your answer book.**
Duration	3 Hours
No. of Pages	Cover Page + 2
Department(s)	Microbiology
Co-ordinator Requirements	
MCQ	Release to Library: Yes √ No
Handout	
Statistical/Log Tables	
Cambridge Tables	
Graph Paper	
Log Graph Paper	
Other Materials	

Q1. Describe the changes that occur in human cells upon becoming transformed into tumour cells by an oncogene-containing virus.

Q2. Write an essay on "”Mutation in *E.coli”* with reference to:
(a) Induction (b) Selection (c) Uses

Q3. Discuss genetic recombination in Bacteria.

Q4. Describe and discuss the characteristics, properties and production of monoclonal antibodies. Compare these characteristics and properties to those of polyclonal antibodies.

Q5. Write brief descriptive notes, with suitable illustrations, on **two** of the following antibody-based tests:

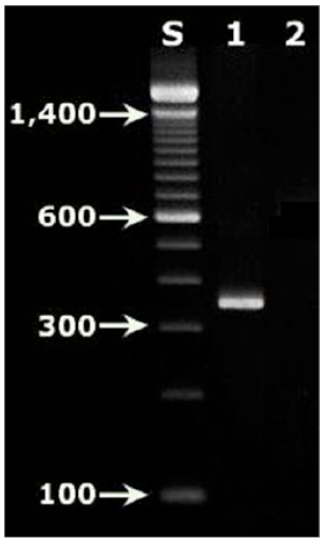
(a) precipitin tests
(b) immunoelectrophoresis
(c) immunomicroscopy

Q6. Describe the biochemical pathways associated with the anaerobic catabolism of amino acids in bacteria.

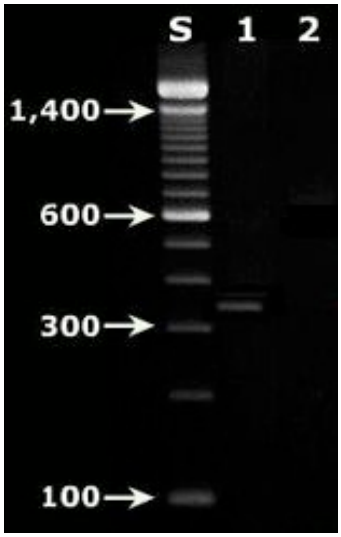
Q7. Write an essay on “The anaplerotic mechanisms utilized by bacteria to replenish intermediates of biochemical pathways”.

Q8. The gel labelled "A" below is a published result of amplification of a 350-bp gene from a human cDNA preparation. When you attempt to repeat the amplification, however, you get the amplification results shown in images B-F in 5 independent experiments. In the case of **each** result, suggest – with explanations – which reaction variable(s) you would change to optimise the reaction in subsequent amplifications. In all gels, "S" is the molecular weight markers, lane 1 contains the sample reaction and lane 2 contains the negative control.

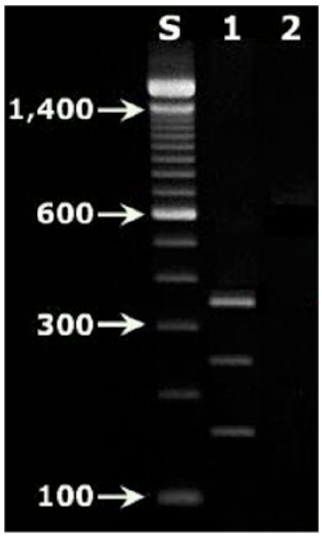
A.



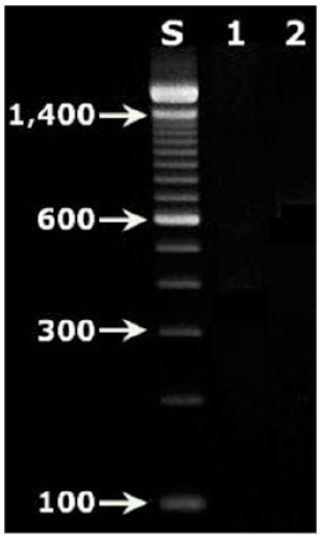
B.



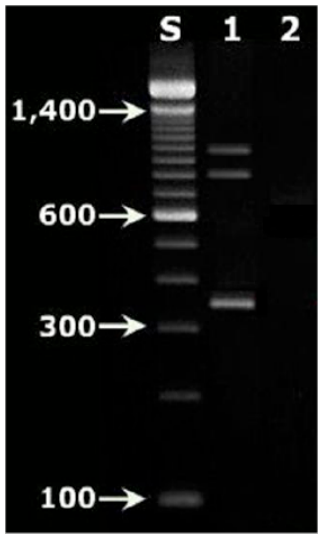
C.



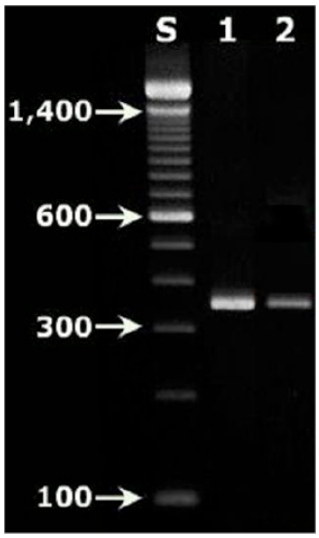
D.



E.



F.



NUI Galway
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Autumn Examinations 2009 / 2010

Exam Code(s)	3BS9
Exam(s)	3rd Year Science Examination
Module Code(s)	MI316
Module(s)	Industrial and Environmental Microbiology
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Other Materials

Release to Library: Yes √ No

Q1. Write an essay entitled "The microbiology of brewing".

Q2. With reference to their role as agents of food-borne disease write short notes on **two** of the following:

a) *Campylobacter jejuni*
b) *Listeria monocytogenes*
c) *Clostridium botulinum*

Q3. Write notes on **three** of the following:

a) Crude media for industrial fermentations
b) Agitation and aeration in industrial bioprocessors
c) Properties of a useful industrial microorganism
d) Strain improvement in industrial microorganisms
e) Volumetric productivity

Q4. Write an essay on "Heat sterilization of industrial media".

Q5. "Water can act as a vector for disease-causing microorganisms". Discuss.

Q6. Outline the key steps in bacterial biofilm development. In your answer, refer to the application of granular biofilms for wastewater treatment

Q7. Describe the various routes of infectious disease transmission. Include in your answer a discussion of human-to-human disease spread, zoonoses and vector-borne diseases.

Q8. Write an essay on "*E. coli* O157:H7". In your answer please consider the following:

a) the cycle of contamination and infection by *E. coli* O157:H7 and how humans can be infected by this bacterium.
b) the tracing of the source of an outbreak of *E. coli* O157:H7.
c) the diagnosis, treatment and prevention of *E. coli* O157:H7 infection.

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Q1. Outline the main requirements for activity of **<u>each</u>** of the following nucleic acid modifying enzymes:

(a) DNA polymerases
(b) restriction endonucleases
(c) DNA ligases

Q2. Describe the changes that occur in human cells upon becoming transformed into tumour cells by an oncogene-containing virus.

Q3. Hypersensitivity and allergy are a consequence of adverse immune reactions. Discuss with particular reference to the mechanisms involved.

Q4. Describe the *in vitro* antibody tests based on agglutination and immunomicroscopy. Include suitable diagrams to illustrate your answer.

Q5. Write an essay on "The degradation of aromatic compounds by microorganisms".

Q6. Describe the metabolic pathway of fatty acid biosynthesis in bacteria.

Q7. Write an essay on "Conjugation in bacteria".

Q8. Discuss recombination in *E.coli.* with reference to **(a)** the process at a molecular level **and (b)** its application in genetic mapping.