Multiple choice (2 pt each)

The following choices are used for questions 1 – 4.

(a) putrefaction
(b) osmophilic microorganisms
(c) xerophilic microorganisms
(d) modified atmosphere packaging (MAP)

1. Microorganisms that prefer low water activity for growth.
2. Proteolysis and anaerobic breakdown of proteins in food, yielding foul-smelling amine compounds.
3. The use of shrink wrap and vacuum technologies to package food.
4. Microorganisms that prefer high osmotic pressure for growth.

The following choices are used for questions 5 – 9.

(a) ergot
(b) *Lactococcus*
(c) *Penicillium*
(d) *Propionibacterium*
(e) bottom yeasts

5. Species of this bacterium are used in the ripening of Swiss cheese to give it’s characteristic flavor and holes.
6. Species of this bacterium are used in the early stages of production of many different types of cheeses.
7. Species of this bacterium are used in the ripening of brie, camembert, blue cheese, and roquefort.
8. This fungus produces a powerful neurotoxin and is usually found in infected grains.
9. This fungus is used in making beer.
The following choices are used for questions 10 – 14.

(a) canning
(b) pasteurization
(c) reduced water availability
(d) radappertization
(e) bacteriocins

10. This is the use of ionizing radiation (gamma radiation) to extend shelf life or sterilize meat, seafoods, fruits, and vegetables.

11. These are bactericidal proteins active against related species. Nicin is an example.

12. In this procedure, food is heated in special containers (retorts) to 115° C for 25 to 100 minutes to eliminate spoilage microorganisms from the food.

13. One way to achieve this method of preservation is to add high concentrations of sugar or salt to the food.

14. In this procedure, food is heated at a specific temperature (usually below the boiling point of water) for a brief period of time to reduce the number of spoilage microorganisms in the food while maintaining the flavor and food quality of the food.

The following choices are used for questions 15 – 19.

(a) food-borne infections
(b) food intoxications
(c) PulseNet
(d) FoodNet
(e) GRAS

15. This is a program established by Centers for Disease Control that uses pulsed-field gel electrophoresis under carefully controlled and duplicated conditions to determine distinctive DNA pattern of each bacterial pathogen.

16. This is a list of chemical additives that are recognized as safe by the US Food and drug Administration.

17. This is the ingestion of poisons in foods in which microbes have grown. The microbes have secreted the poisons in the food, and the development of symptoms does not require the colonization and growth of the microbe in the host.

18. This is an active surveillance network used to follow nine major food-borne diseases, allowing public health officials to rapidly trace the course and cause of an infection in days rather than weeks.

19. This is the ingestion of microbes in contaminated food, followed by colonization and growth of the microbes in the host, tissue invasion, and/or release of toxins within the body of the host.
The following choices are used for questions 20 – 24.
(a) must
(b) mashing
(c) malt
(d) rennin
(e) silages

20. This is fermented grass or corn used as an animal feed.
21. This process, used in the making of beer, ales, and some liquors, is the hydrolysis of complex carbohydrates in cereals by addition of water and heating mixture. It yields a liquid called wort containing fermentable carbohydrates.
22. This is germinated barley grains having activated enzymes, used in making beer and ales.
23. This is an enzyme used in the early stages of cheese production.
24. This is the juice from crushed grapes, used in wine making.

The following choices are used for questions 25 – 28.
(a) probiotics
(b) prebiotics
(c) protoplast fusion
(d) site-directed mutagenesis

25. These are oligosaccharide polymers that are not processed until they enter large intestine.
26. This is the insertion of chemically synthesized DNA into a gene to create genetic changes.
27. These are microbes added to diet in order to provide health benefits beyond basic nutritive value.
28. In this method, the cell walls are enzymatically removed from the cells of different strains or species of microbes, then the cells are mixed together with an agent that causes the cells to merge. This is used to transfer DNA from one strain to another, and is used for fungi and certain types of gram positive bacteria.
The following choices are used for questions 29 – 33.

(a) protein engineering
(b) metabolic pathway engineering
(c) non-Newtonian broth
(d) scaleup
(e) continuous feed

29. This is the continual addition of a critical nutrient so that microbes will not have excess substrate available at any given time. An example is growth in a chemostatic culture.

30. This is the modification of growth conditions for an organism to maximize the growth or output in a large scale fermenter. For example, when *Bacillus stearothermophilus* is grown in a 50 liter fermenter, a pH control unit must be used to add NaOH to the culture; otherwise, the culture will only reach about 1/5 of its maximum growth.

31. This is deliberately making alterations in amino acid sequence of a protein in order to generate enzymes with new or improved properties.

32. This is a thick, viscous medium resulting from growth of filamentous fungi or actinomycetes, making it difficult to stir or aerate the culture.

33. This is the intentional alteration of metabolic pathway by inactivation of specific genes.

The following choices are used for questions 34 – 38.

(a) primary metabolites
(b) secondary metabolites
(c) regulatory mutants
(d) biosurfactants
(e) biotransformations

34. This refers to strains of microbes in which a particular product (e.g., an amino acid) is continuously produced by the strain instead of its production being induced or inhibited by the culture media or other growth parameters.

35. These are amphipathic, detergent-like compounds produced by certain microorganisms. They are useful in treating oil spills.

36. These are microbial produces that accumulate in a culture during stationary phase. Antibiotic production is an example of such a product.

37. These are microbial products that accumulate during the growth phase (log phase) of a culture. Amino acid production is an example of such a product.

38. These are minor changes in a molecule carried out either by microbes or enzymes isolated from microbes, used in the production of certain substances. An example is the addition of an -OH group to a steroid molecule.
The following choices are used for questions 39 – 42.

(a) recalcitrance  
(b) reductive dehalogenation  
(c) land farming  
(d) natural attenuation

39. This is the incorporation of waste or flow of waste across soil, where degradation occurs.
40. This refers to the resistance of a compound to biodegradation.
41. This is the use of the microbial communities indigenous to a particular environment to carry out biodegradative process.
42. This is the removal of bromine or chlorine molecules from organic compounds, and is often an early step in the biodegradation of these compounds.

The following choices are used for questions 43 – 46.

(a) meta effect  
(b) engineered bioremediation  
(c) phytoremediation  
(d) bioaugmentation

43. This is bioremediation accomplished by microorganisms growing in the root systems (rhizospheres) of plants.
44. This term refers to the fact that, when halogen atoms are found at a particular location on an aromatic phenyl ring, the compound will be more difficult to biodegrade, and its biodegradation will take much longer.
45. This is bioremediation accomplished by the addition of nonindigenous microbes to the soil or other environment; it has often had limited success (short term increases in biodegradation rates) because the added microbes must compete with the natural communities.
46. This is the addition of O₂ or nutrients to soils or water in order to stimulate biodegradative activities of microbes.
47. Which of the following statements is true?

(a) Endotoxins produce varied effects such as neurotoxic or protein inhibition effects, but exotoxins produced generalized irritation and inflammation of epithelial surfaces.
(b) Endotoxins are a component of the cell wall of gram negative bacteria, but exotoxins are secreted toxins that may exhibit their effect independently of the presence of the bacteria, and are found in both gram-negative and gram-positive bacteria.
(c) Exotoxins include the neurotoxins of botulism and tetanus, while endotoxins include the enterotoxin of *Staphylococcus aureus*.

48. Both staphylococcal food poisoning and salmonellosis can be acquired by eating contaminated food. After eating contaminated food, the time required for the onset of staphylococcal food poisoning is usually shorter than that for salmonellosis because

(a) *Staphylococcus aureus* grows more rapidly than *Salmonella enteritidis* serotypes.
(b) cells of *Salmonella* must reach the bloodstream before symptoms of gastrointestinal irritation are experienced.
(c) foods that contain *Salmonella* are usually eaten raw.
(d) *Staphylococcus aureus* grows only under conditions of high salt concentration.
(e) staphylococcal food poisoning is due to the presence of an exotoxin that forms in the food before it is eaten, but salmonellosis requires the colonization and growth of the bacteria in the intestine.

49. In a quality assurance (HACCP) plan in a poultry processing plant, which of the following organisms is routinely monitored to detect fecal contamination of the meat?

(a) *Vibrio cholerae*
(b) *Salmonella typhimurium*
(c) *Escherichia coli*
(d) *Listeria monocytogenes*
(e) *Staphylococcus aureus*

50. In a quality assurance (HACCP) plan in a poultry processing plant, which of the following organisms is routinely monitored to detect contamination of the meat from the skin of the workers handling the food?

(a) *Vibrio cholerae*
(b) *Salmonella typhimurium*
(c) *Escherichia coli*
(d) *Listeria monocytogenes*
(e) *Staphylococcus aureus*