Certainly! Here are 20 multiple-choice questions along with their answers based on the provided lecture notes on molecular biotechnological methods, focusing on 16S and ITS rRNA sequencing, DNA extraction, PCR, agarose gel electrophoresis, DNA elution, DNA sequencing, DGGE, and FISH techniques:

### 16S and ITS rRNA Sequencing:

1. \*\*What is the role of the 16S rRNA gene in prokaryotic ribosomes?\*\*

a. Encodes a protein

b. Regulates gene expression

c. Involved in ribosomal structure

d. Controls cell division

\*\*Answer: c. Involved in ribosomal structure\*\*

2. \*\*What is the significance of the variable regions in the 16S rRNA gene?\*\*

a. They determine the isoelectric point

b. Used for phylogenetic classification

c. Encode specific proteins

d. Regulate gene expression

\*\*Answer: b. Used for phylogenetic classification\*\*

3. \*\*Which region is commonly used for identifying fungal species in metagenomic samples?\*\*

a. 16S rRNA gene

b. ITS region

c. 30S small subunit

d. Conserved regions

\*\*Answer: b. ITS region\*\*

4. \*\*What is the primary advantage of using ribosomal RNA in molecular techniques?\*\*

a. Presence in all cells

b. Specific to bacterial cells

c. Encodes essential proteins

d. Controls cell division

\*\*Answer: a. Presence in all cells\*\*

### Steps in Ribosomal RNA Sequencing:

5. \*\*What is the purpose of the extraction of DNA in ribosomal RNA sequencing?\*\*

a. Obtain protein sequences

b. Analyze RNA structure

c. Prepare DNA for sequencing

d. Determine isoelectric points

\*\*Answer: c. Prepare DNA for sequencing\*\*

6. \*\*What is the main advantage of using low melting point agarose in DNA elution?\*\*

a. Enhances DNA denaturation

b. Reduces DNA contamination

c. Facilitates DNA band identification

d. Increases DNA stability

\*\*Answer: c. Facilitates DNA band identification\*\*

### Polymerase Chain Reaction (PCR):

7. \*\*What is the primary purpose of the Polymerase Chain Reaction (PCR)?\*\*

a. Protein quantification

b. DNA purification

c. Amplification of DNA sequences

d. RNA degradation

\*\*Answer: c. Amplification of DNA sequences\*\*

8. \*\*Why is PCR preferred over nucleic acid-based detection techniques?\*\*

a. Complexity

b. Sensitivity

c. Specificity

d. Stability

\*\*Answer: b. Sensitivity\*\*

### Agarose Gel Electrophoresis:

9. \*\*What is the role of electrophoresis in the laboratory for separating charged molecules?\*\*

a. Quantify proteins

b. Separate DNA fragments

c. Amplify DNA sequences

d. Denature RNA

\*\*Answer: b. Separate DNA fragments\*\*

10. \*\*What is the purpose of ethidium bromide in agarose gel electrophoresis?\*\*

a. Denature DNA

b. Stabilize DNA

c. Visualize DNA

d. Quantify RNA

\*\*Answer: c. Visualize DNA\*\*

### Elution of DNA:

11. \*\*What does elution in DNA extraction refer to?\*\*

a. DNA denaturation

b. DNA band identification

c. DNA precipitation

d. Extraction of specific DNA bands from gels

\*\*Answer: d. Extraction of specific DNA bands from gels\*\*

### Sequencing and Identification:

12. \*\*What is the process of determining the order of nucleotides in DNA called?\*\*

a. DNA isolation

b. DNA sequencing

c. DNA amplification

d. DNA denaturation

\*\*Answer: b. DNA sequencing\*\*

13. \*\*Which bioinformatics platform is commonly used for analyzing DNA sequences?\*\*

a. PCR

b. DGGE

c. FISH

d. BLAST

\*\*Answer: d. BLAST (Basic Local Alignment Search Tool)\*\*

### Denaturing Gradient Gel Electrophoresis (DGGE):

14. \*\*What is the main principle of DGGE for separating DNA fragments?\*\*

a. Separation based on size

b. Separation based on charge

c. Separation based on melting characteristics

d. Separation based on sequence complementarity

\*\*Answer: c. Separation based on melting characteristics\*\*

15. \*\*What is the advantage of using PCR-DGGE in studying microorganisms in food fermentations?\*\*

a. Identifies total RNA

b. Profiles genetic diversity

c. Analyzes protein sequences

d. Quantifies DNA

\*\*Answer: b. Profiles genetic diversity\*\*

### Fluorescent in Situ Hybridization (FISH):

16. \*\*What is the purpose of FISH in molecular cytogenetics?\*\*

a. Amplify DNA

b. Quantify proteins

c. Visualize specific nucleic acid sequences

d. Purify RNA

\*\*Answer: c. Visualize specific nucleic acid sequences\*\*

17. \*\*What is a probe in the context of FISH?\*\*

a. DNA denaturant

b. Fluorescent chemical

c. Gel matrix

d. DNA stabilizer

\*\*Answer: b. Fluorescent chemical\*\*

### 2D Gel Electrophoresis:

18. \*\*What is the primary purpose of 2D gel electrophoresis in proteomics work?\*\*

a. Quantify RNA

b. Visualize DNA

c. Separate proteins based on two properties

d. Denature proteins

\*\*Answer: c. Separate proteins based on two properties\*\*

19. \*\*In the second dimension of 2D gel electrophoresis, how are molecules separated?\*\*

a. Based on charge

b. Perpendicularly from the first dimension

c. Based on melting characteristics

d. Based on sequence complementarity

\*\*Answer: b. Perpendicularly from the first dimension\*\*

20. \*\*What property is used in the first dimension of 2D gel electrophoresis to separate proteins?\*\*

a. Molecular weight

b. Isoelectric point

c. Charge

d. Melting characteristics

\*\*Answer: b. Isoelectric point\*\*